THE HEATING AND VENTILATING MAGAZINE

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THE ADVANCE OF TEMPERATURE REGULATION

Temperature control or regulation by means of automatic devices is a development, commercially speaking, of the past twenty years. Yet long before that time, indeed, as early as the introduction of furnace heating, the inventive genius of a Yankee by the name of Tingley produced a temperature regulator, several of which were in operation up to a few years ago.

This device was simple, easily applied and required but little attention. Tingley, strange to say, used compressed air and a double damper actuated by a diaphram, the methods which are in use to-day. A small, hollow cylinder was placed either outdoors or in the cold air duct of the furnace. A second cylinder was placed in the largest heated air duct, both cylinders being connected with a small lead pipe. A branch pipe from a point between the two cylinders led to a diaphram motor, which completed the installation.

In erecting the furnace two pipes about 6 inches in diameter were so arranged that one opened into the ash pit and the other into the fire chamber. The other ends of the two pipes were brought together and a double damper was fitted to the flues, so that when one was opened the other was closed. The diaphragm motor operated the dampers, the motor power being supplied by the lungs, from which we must assume that the more powerful the lungs the greater the motive power.

Tingley's use of the human body as an air compressor was ingenious, indeed, as will be seen. In the diaphragm chamber was an aperture, which was closed by a pointed plug, the unscrewing of which permitted the introduction of the end of a blow pipe. A long, deep breath was discharged through the blow pipe into the diaphragm chamber and, as the blow pipe was withdrawn, the plug was screwed into its socket and covered with sealing wax.

The motive power being supplied in this manner, it only remained to adjust the regulation. The room to which the heated air flue (containing one of the cylinders) was connected being heated to 70 degrees, a sliding weight was adjusted in such a way that the expansion of air in the cylinders would move the dampers. The flue leading to the ash pit would close when the other opening into the fire chamber would open. Thus the combustion of fuel could be checked, this in turn lowering the temperature of the heated air, gradually contracting the air in the heated cylinder, resulting in a gradual opening of the draft damper, with a corresponding closing of the check damper.

It worked well and gave good results. A sudden fall of the outdoor temperature would start the fire and the opening of a window in a room would soon affect the position of the drafts.

Other devices were patented, but none appears to have been successful until electrical appliances came into general use. Among the earliest devices in which electricity figured was a system brought out by

parties in the upper part of New York State, a feature of which was the expansion of brass and steel stripes joined or riveted together and held firmly at the top. The lower ends of the stripes were used to complete an electric circuit. This circuit controlled clockwork and the clockwork, in turn, operated a valve connected to a steam or hot water radiator.

This system was not a success. Several other clockwork devices, controlled electrically or otherwise, have been introduced, but none of them have come into general use.

About twenty years ago, E. N. Dickerson, Esq., an eminent patent lawyer of New York, invented what may be termed an electro-hydraulic system of temperature regulation and an installation of it was made in his residence. The system had its imperfections, but it was a step in advance. Then from the West came another device, namely, an electro-pneumatic system, consisting of a thermostat which operated by the expansion or bending of a compound bar made of a strip of brass and hard rubber. The movement of the bar completed a circuit and actuated a pneumatic valve—that is to say, opened an air passage, allowed the compressed air to flow into a diaphragm chamber and operated the drafts of a heater. Even this device was not, at first, a success, owing to electrical and mechanical difficulties.

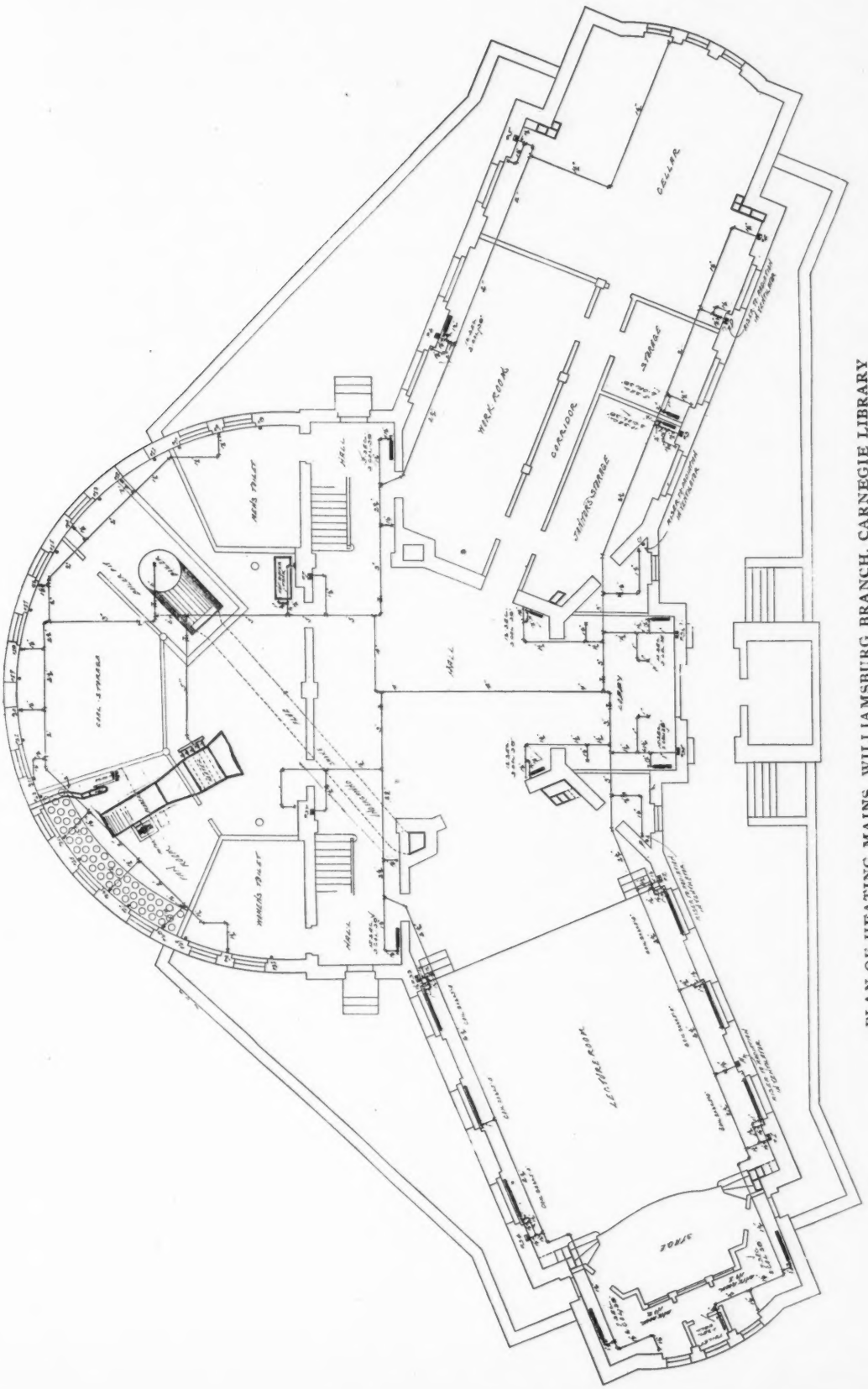
An improvement was subsequently made upon it, the same type of thermostat being used, excepting that the expansion of the compound bar was used in operating a pneumatic valve to turn on compressed air and the contraction of the bar operated the pneumatic valve to discharge the compressed air after it had been used in closing steam valves or dampers.

This system also consisted of an air compressor, which was operated by water pressure from the house supply pipes, the air being compressed into a cylindrical receiver. Pipes were connected to the receiver and to the electro-pneumatic valves and from the E. P. valve to the diaphragms, which closed off either steam, hot water or hot air. Electric batteries, also, were connected by wires to the thermostat and from thence to the E. P. valves.

This system was used for a number of years until its inventor and others succeeded in making a thermostat that would operate without the aid of electricity. Hydraulic or steam air compressors were used to compress air into a receiver. Pipes were connected to the receiver and distributed to the various rooms desired or which were to be controlled, all of which were connected with the thermostat. Other pipes were connected with the thermostat and to the heat source. The thermostat, being an air cock automatically controlled by the temperature of the room in which it was placed, operated, in case of a change of temperature, to turn on or off the compressed air, as the case might be, thus regulating the heat supply. At about the same time that the electro-pneumatic system was first introduced, a device was invented based on the expansion and contraction of a volatile fluid. The thermostat consisted of a metal shell, divided into two chambers, one chamber containing the volatile fluid. The fluid, expanding in accordance with the changes in the temperature, created a pressure against a corrugated diaphragm, the movement of which, in turn, created a pressure above that of the atmosphere. The corrugated diaphragm was connected with tubing to a rubber diaphragm, which, by a multiplication of levers, operated the drafts of a heater.

In the electro-pneumatic system, some of the thermostats operate by the expansion and contraction of metallic bars and some by the expansion of volatile fluids, which are used to operate small valves in turning on or off compressed air.

As is natural in an art of such comparatively recent development, improper or imperfect installation has from time to time injured the cause of temperature regulation. In many cases the efficiency of a sys-



PLAN OF HEATING MAINS, WILLIAMSBURG BRANCH, CARNEGIE LIBRARY

tem has been impaired through the placing of the thermostats in positions where their operation was affected by their proximity to hot air flues, drafts or in dead air spaces. Cases are known where it was proposed to place the thermostats in closets, or on the cornices of a room. In one instance an architect suggested that the thermostats be sunk in the wall and covered by a grill, which he would design. In another, it was determined to place them in the registers of the ventilating system.

A common difficulty arises from the fact that while a thermostat may be working accurately, the sun shining through the window glass will often raise the temperature of a room several degrees beyond the regulating point. Under these circumstances it frequently requires an effort to convince the occupants that this is not the fault of the temperature regulating apparatus. Again, it is sometimes found that uncovered steam pipes supplying heat to other rooms extend through a room having a thermostat. The radiators may be cold, yet sufficient heat is radiated from the uncovered pipes to raise the temperature. In one of New York's prominent residences fault was found with the temperature regulation after the heating system was closed, because of the fact that the temperature in the rooms was above 70 degrees, the temperature at the same time outdoors being 75 degrees.

The temperature regulation of rooms in office buildings is often seriously affected by the changing of partitions and through other alterations, it sometimes happening that the changes made will leave the thermostat on one side of a partition and the radiator on the other. In a Chicago office a telephone booth was put up at a point where it enclosed the thermostat and consequently a complaint against the system was registered at the superintendent's office. Considerable argument was necessary to convince both tenant and superintendent as to where lay the fault.

Air valves on the radiators are sometimes the cause of poor circulation of the steam which will destroy the efficiency of the regulating apparatus.

On the other hand, it is worthy of note that one of the earliest installations of a temperature regulating system in a large New York office building is to-day in successful operation.

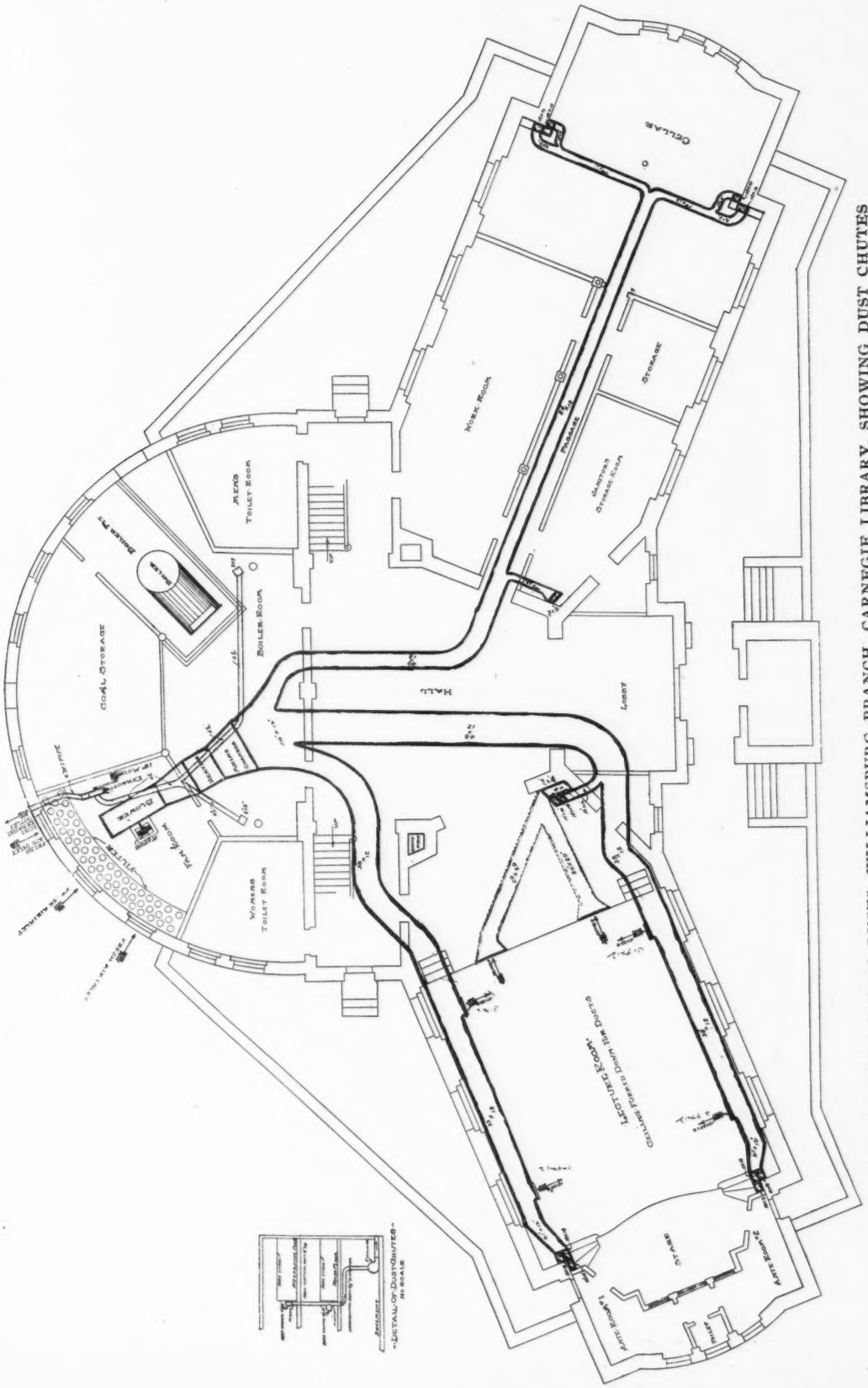
A TYPICAL HEATING AND VENTILATING PLANT FOR A LIBRARY BUILDING

The accompanying plans are representative of those adopted for the heating and ventilating of many of the Carnegie library buildings being erected in different parts of the country. It is noteworthy that, for the most part, direct radiation has been adopted for the heating of these buildings. The plant described is that of the Williamsburg Branch, Carnegie library building, in Brooklyn, N. Y.

Included in the ventilating apparatus of the building in question are two air chutes, running from the mezzanine of the stack room to the basement and thence to an outlet in the side of the building. These dust chutes have openings in the main stack room as well as in the mezzanine stack room.

Each chute is equipped with an exhauster for the purpose of removing the dust that accumulates upon the books. This is a noteworthy feature, for in all library buildings the dust problem is an important one, and in many of our older buildings the removal of the dust is accomplished at considerable inconvenience.

In the use of the arrangement noted the books are held over the openings in the dust chutes and the dust is drawn into them as it is brushed from the books and carried off through the outlet.



PLAN OF VENTILATING DUCTS, WILLIAMSBURG BRANCH, CARNEGIE LIBRARY, SHOWING DUST CHUTES

The plant shown herewith includes a 70 H. P. Fitzgibbons boiler, tested to 125 pounds hydrostatic pressure. The boiler is connected with the main smoke stack by a horizontal flue running under the floor.

The ventilation ducts are supplied by a 100-in. full housed steel plate blower, run at a speed of 225 revolutions per minute and operated by a direct connected motor. The fan coil is of the sectional type, made up of five sections. Each section has four rows of pipe, eighteen pipes to the row, with a total capacity of 3,500 feet of one-inch pipe.

All of the hot air openings from the vertical flues are taken into the rooms near the ceiling lines and the openings in the vent flues are provided for top and bottom ventilation. The vent ducts are carried up into a space between the ceiling and the roof.

The architects of the library are Walker & Morris, of New York; the consulting engineer, Frank Sutton, and the constructing engineers of the plant, Blake & Williams, New York.

THE HYGIENE OF HEATING

Considerable of a dispute is being waged at Saginaw, Mich., before the Board of Education as to the relative merits of heating by hot air and by steam.

An interesting contribution to the discussion is a letter to the Board from Mr. H. E. Light, an engineer of that place, who compares the two methods thus:

First, as to Furnace Heat.—All constructions for that kind of heat are of dry iron plates, the fire acting on the inner surfaces of the same and the air for school rooms passing over the exterior surfaces of the same, absorbing the heat and passing to the flues for delivery to the several rooms. These plates are more intensely heated than are those for steam surfaces.

Relative heat on furnace plates are as follows, viz.:

Dull red heat by twilight, 500 degrees.

A bright red heat by twilight, 750 degrees.

A cherry red heat by twilight, 1,070 degrees.

A bright cherry red by twilight, 1,500 to 1,860 degrees.

A white heat (melting), 2,400 to 2,900 degrees.

(See Haswell's Mechanics).

The Massachusetts Board of Health, in extended experiments assisted by chemists, found that carbonic acid gas, incident to combustion, would escape through iron plates on reheating not exceeding 500 degrees of heat. These intense heatings of the plates, with the warping of joints and many times melting of same, causes such serious impairment as to permit fatal conditions to the atmosphere.

How Furnace Heat Becomes Fatal to Health.—The combustion of anthracite or bituminous coal used in heating, with undue exposures, is a serious menace, often fatal to life. Carbonic acid gas is generated on low temperatures of combustion, indicated by blue flame; carbonic dioxide on more intense action and with much of sulphur in the fuel; carbonic disulphide, a poison so intense that a limited quantity will make a strong person unconscious in 30 minutes and cause death in two hours. These deadly gases from combustion render the air unwholesome for respirations and often deadly to the inmates.

At Norwich, Conn., 27 inmates of a school were asphyxiated by escaping gases from combustion. Removed to the outer air, they revived.

Subsequent investigation showed the furnace plates were burned through and carbon-dioxide had escaped to the school apartments through the heating flues. A more notable case was that recently at Quebec. In many years of extended observation I have known of many such cases in the use of both furnaces and stoves, the last being in Detroit, as

per *News* of the 27th inst. The terms "The Deadly Furnace" and "The Deadly Stove Gas" are familiar to *News* readers. Another important consideration is that air for respiration should be as nearly normal as possible. It should neither be deprived of its constituent gases nor of its vapor. Dry air does not exist in the free atmosphere.

Aqueous vapor exists under all the varying temperatures of free atmosphere and is lost to the air only under artificial conditions, prominent among which is the intense heating of the hot air furnace. In this condition it is often referred to as burned air and becomes unfit for proper respiration. This latter condition also destroys the animacule life.

A healthy robust lady living in an elegant residence, warmed with a hot air furnace, became an invalid requiring medical attention. Diagnosing her case, physicians said it was a case of furnace poisoning, and required the furnace removed and the installation of steam heat. Under the wholesome effects of the latter, her health was fully restored. When apartments are densely occupied, animalcule or germ life is rapidly increased, and the air passing intensely heated furnace plates, the germ life is killed and accumulates in passages to and in the apartments. In removing the old furnace flues from the German Lutheran Church, at Sebewaing, in 1904, the accumulation of waste germ life was so offensive that the laborers had to cease work to obtain fresh air and then continue.

Many cases of what is known as furnace poisoning are known to the medical profession and to communities. The air in its burned conditions so thoroughly permeates many buildings that it is quickly detected by non-occupants.

Hot Blast Heating.—This more modern method for large buildings is of greater evil than is the action of the ordinary hot air furnace. The more rapidly lower temperature air passes the plates of the furnace, the more intense the heat must be. The more intense the heat, the more fatal to the castings, and the more quickly the deadly gases come to penetrate the air the fans are carrying to the apartments.

The Lapeer High School contracted for a hot blast system in 1900, and in 1901 had it removed and steam heat gravity system installed. Very many of the larger public buildings of the State have changed from the hot air system to steam heat. Shorter life of the hot air blast system with much more of average annual expense is another important item.

Steam a Sanitary Heat.—Steam heat is of so much lower temperatures, so much more uniform, so much more easily regulated and of so much longer life that it becomes much more desirable.

By it the passing air to apartments is not despoiled of conditions of good hygiene, the warmth is easily distributed and, if properly set, as effective at extremes as near the location of generation. Setting the boiler plant in brick masonry, the action of the fires is only within the walls and onto the surfaces of the boilers, the gases of combustion being carried direct to the chimney flue. Water in the boiler keeps the temperature down until at 212 degrees steam is generated and from 240 degrees (a maximum in proper heating), the steam is distributed onto the surfaces warming the building, or for warming the air if distributed by the fan system. At the above temperature, the iron chambers and pipes carrying the steam are not rendered porous or impaired. The air is not unsanitary and does not lose its aqueous principle. The air itself seldom passes at a temperature higher than 180 degrees and from the surfaces on is commingling with the air volumes of lower temperatures, inspirations of which are at a normal condition.

It is for the above reasons that steam or water warming of greenhouses or conservatories protects the life and better growth of the plants. Air passed over the heated plates of furnaces is so impaired that it will not sustain good life and growth. The

hygiene of steam warming is so superior to that of furnace heat, that with the results the only question should be as to distribution, which may be by the fan (known as the Plenum system) or by the gravity return system, either of which are entirely effective and with electric regulation the warmth to the several apartments is held uniform at whatever temperature desired and on a variation not exceeding two degrees. Such regulation is not practically applied to furnace heat.

UTILIZING WASTE STEAM IN SHOPS FOR HOT WATER HEATING SYSTEMS

That waste steam in a boiler feedwater heating system may be used with success and economy in heating not only the shop containing the plant, but other nearby buildings as well, has been demonstrated at the locomotive works of the Grand Trunk Railway, at Montreal. It appears that the discovery as to the extent of its effectiveness in this case was made somewhat by accident, having followed an attempt to utilize the waste exhaust steam for feed water heating. The result was an unexpectedly profuse supply of hot water, and it is this hot water which has been used for heating the various buildings.

The idea as described by Mr. A. A. Maver, master mechanic of the Grand Trunk Railway shops in Montreal, at a recent meeting of the Canadian Railway Club, originated three years ago in connection with a shortage of steam supply due to increased demands. A system was inaugurated of conveying the exhaust steam from the stationary engines, steam hammers and pumps to the condensers instead of to the outside air through exhausters. The water from the condensers then flowed into hot wells and was pumped through superheaters and delivered to the boilers at a temperature near boiling point.

Formerly the water was delivered by injectors at a temperature of about 65 degrees, but on account of the greatly increased temperature, due to the use of this waste heat, the results were such that instead of a steam shortage, although forcing every boiler to the extreme limit, we were enabled to shut down several and yet maintain a satisfactory pressure.

By an approximate rule for the conditions of ordinary practice, a saving of one per cent. is made by each increase of eleven degrees in the temperature of the feed water, and, according to this rule, the saving in fuel is about thirteen per cent., with a still further inclination to save due to less fuel handled, boiler attendance, etc.

The system as we have it in operation at Montreal is shown on the diagram, figure 1.

To the left is shown an 8-inch cast-iron receiver pipe *A*, which conveys the exhaust steam from the stationary engines, steam hammers, etc., each engine or hammer having its exhaust pipe coupled to this receiver by means of a *Y* connection *B*, having a 4-inch branch which, by means of a reducer, can be coupled to any size of exhaust pipe.

At our blacksmith shop one of these receiver pipes runs the entire length of the shop, about a foot below the ground surface, having twelve connections from engines and hammers, and discharges into a jet condenser *C*. Inside of this condenser there is a funnel-shaped plate with a center opening about 10 inches diameter just above the manhole. Jets of cold water are arranged to play upon this plate, condensing the steam as it comes in contact with the plate and cold water.

A few inches below the manhole, a circular angle iron supports a bed of charcoal, carried on a perforated plate, the charcoal being covered with a fine copper mesh, which is cleaned off at regular intervals.

This is for the purpose of separat-

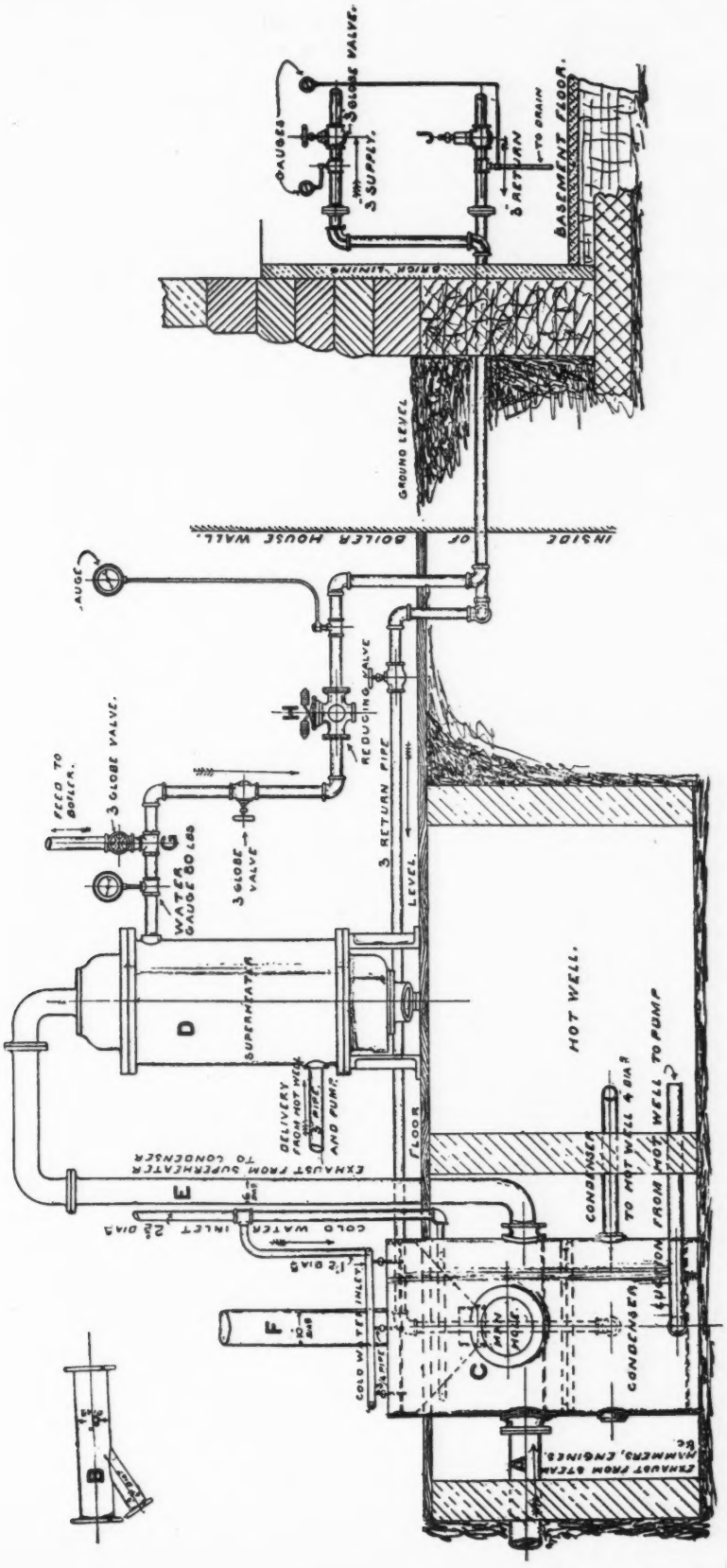


Fig. 1.

UTILIZING WASTE STEAM FOR HOT WATER HEATING PURPOSES

ing impurities from the water of condensation, which then flows through the purifying bed to the bottom of the condenser and thence to the hot well.

The exhaust from one of our large engines is passed in at the bottom of superheater *D*, and thence to the condenser by pipe *E*.

The pump is set into a pit as low as bottom of the well from which the water flows by gravity to the pump, and having therefore no suction duty to perform, it simply forces the hot water through the superheater and thence to the boilers.

It frequently happens that the exhaust steam comes into the condenser in greater volume than it pays to condense it all, and when the floating indicator in the well shows that the hot water is about to flow over and go to waste in the drain, the condensing water is cut off and the uncondensed steam passes out at the top of the condenser to the atmosphere by means of the 10-inch galvanized pipe *F*.

Aside from the saving effected by capturing and utilizing this waste heat, which used to escape by numerous pipes through the roofs, presenting a very unsightly appearance, we eliminate to a large extent the trouble we formerly experienced during the winter season, caused by icicles forming along the caves, particularly by condensation thrown from steam hammers; these icicles obscured the light and were often the cause of broken windows when they fell; but since the disappearance of the exhaust steam the shop externally presents a clean, tidy appearance, in marked contrast with its former appearance, especially during the winter season.

After the system which has just been described had been in operation for some months it occurred to the writer that, as we had such an abundance of hot water, it might advantageously be used for heating purposes, and accordingly it was decided to connect one of our hot feed water pumps to the existing system of hot water radiators in the motive power offices, which had hitherto been heated by a furnace in the basement, and annually consumed some seventy tons of anthracite coal, besides all the attendant work in connection with the furnace, handling of coal, ashes and dirt, and dust throughout the building. This building is 60 feet by 60 feet, with four floors and a basement, and stands isolated about 200 yards from the works.

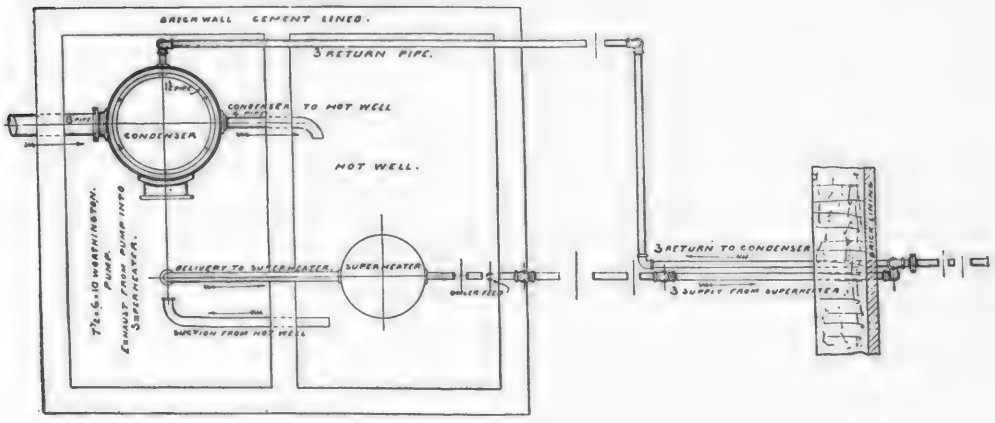
The connection was made by putting a tee fitting *G* on the feed pipe to boilers and beyond this a reducing valve *H* was attached to reduce the pressure. A 3-inch flow pipe and 3-inch return pipe were laid in a box about a foot below the ground level. On the return pipe a valve *J* was placed to regulate the return water, which requires to be faster when the temperature is low.

A retaining valve having a spring screwed down to resist a pressure of some fifteen pounds greater than the head of water in the building was put on the return pipe at a convenient point between the regulating valve and the condenser. The object of this retaining valve is to insure the whole system being kept full and under pressure, thereby preventing air being drawn in.

When this building was heated by the basement furnace frequent complaints were made about low temperature during severe cold weather, but the water now pumped through the radiators is so much higher in temperature that 75 degrees can be steadily maintained during zero weather.

The results were so satisfactory in every way that it was decided that the Railway Y. M. C. A. building, which was under construction, should be heated in a similar manner. This building is about 150 feet long by about 50 feet wide, and is situated across the street from the motive power offices and has three floors and a basement.

The heating system of this building is connected to the same 3-inch pipe which conveys hot water to the motive power offices; but on entering the building it discharges into a 5-



SECTIONAL PLAN OF FIG. 1

inch pipe, and about the center of the building this pipe rises vertically, carrying the water to the ceiling of the top floor, where it discharges into a 4-inch pipe which runs the entire length of the ceiling, having a number of $2\frac{1}{2}$-inch branches on either side running to the side walls and dropping to the radiators of each floor, finally discharging into the return pipe in the basement, and is conveyed back to the condenser. An additional pump was installed on account of the increased duty, and they are connected so that if one of them is under repairs the other will keep up the circulation.

This arrangement has given satisfactory service during the past two severe winters. It differs from that of the motive power offices, where the water is forced upward through the radiators, it being thought that the downward flow through the radiators would be better adapted for this forcing system, but experience has shown that they are equally satisfactory.

By this scheme the Railroad Y. M. C. A. was relieved of the expense of installing heating furnaces, and also the much greater expense of providing fuel annually for heating purposes. The new Railroad Y. M. C. A. building at Stratford is similarly heated from the works. In the abscence of exhaust steam, when the works are closed, the well is heated by live steam.

A large portion of the Montreal works is now heated by this method, which is being gradually adopted throughout the system for workshops and round houses, with certain modifications to meet local conditions. Where the supply of exhaust steam is limited, the condenser is dispensed with. Within the past year or two, five new round houses have been built at various points on the system, which are very satisfactorily heated in the following manner:

The exhaust from the stationary engine, air compressor and pump, are passed through the superheated and thence direct into the hot well; the water is then pumped through the superheater, and after circulating through the heating coils returns to the well.

Steam blown from locomotives is discharged direct into the well. The temperature of these round houses is such that engines are soon thawed out, permitting of necessary repairs and cleaning being done; and in addition to this, the house being comfortable and warm, the whole round house staff renders more efficient service than when working in discomfort, and the engineers and firemen are attracted to spend their spare time working about their engines, as is the custom with many during the summer, but which only the most faithful and devoted will do in a cold and draughty building.

We have a pumping station at the

river bank for supplying water to the works, where formerly the feed water for the boilers was delivered at river temperature, but since the installation of a condenser, shown as Fig. 2, a saving has been effected of about seventeen per cent. in fuel.

This spray condenser is 2 feet 3 inches in diameter by 4 feet 6 inches in height, and stands on the floor beside the boilers; a perforated pipe to deliver a spray of cold water is inserted into the side of the condenser near the top, the water descending over four plates forming partitions about 8 inches apart, each plate having an opening at one side so arranged that the water follows a zigzag course.

Below these plates and a little below the center of the reservoir, the exhaust steam from the pump enters and as it ascends between the plates it is met and condensed by the descending water, and with it flows to the bottom through a perforated plate, from which point it is delivered to the boilers by feed pump. A water gauge glass is applied to the side of the condenser, and the flow of condensing water is regulated to keep the body of the water in the condenser below the entrance of the exhaust steam; a pipe to the atmosphere permits of the escape of excess steam.

This arrangement has proven so satisfactory that authority has been given to have a similar device applied to road pumping stations, and when this has been done, a station or any company's house within a reasonable distance of the pump house may be heated by the boiler feed pump in the manner already described.

A pipe of comparatively small dimensions will suffice to carry the hot water to the building to be heated, but the pipe to which the branches are connected should be of such ample proportions as will insure the branch at the furthest extremity being properly fed; in other words, it should be considered as a reservoir to feed the branches.

Shortage of steam and the heating of buildings is a vexed question with many and to those who are grappling with it, this description of how the matter has been dealt with may convey some suggestions which will produce equally beneficial results.

Answering a question that was brought up in the subsequent discussion of the paper Mr. Maver said that there is absolutely no back pressure brought on the engines or pumps, the operation of the condenser tending toward a vacuum rather than back pressure. The atmospheric vent, also, provided on the condensing chamber makes impossible any degree of vacuum.

THE PRINCIPLES OF VACUUM STEAM HEATING

It is, of course, known that the air which surrounds the earth gravitates like other bodies toward the earth's surface and at the sea level exerts a pressure of 14.7 pounds to the square inch. Its density is greatest at the sea level, but decreases as the altitude above the sea increases, and it is known that under atmospheric pressure of 14.7 pounds water boils and generates steam at 212 degrees Fahrenheit, but should the air pressure be decreased by reason of higher altitude or by the exhaustion of the air from within a closed vessel, the temperature of the boiling point of water decreases until, under a complete vacuum, water boils and generates steam at 98 degrees Fahrenheit.

The dictionary definition of the term "vacuum" is empty space, or space void of matter, but when the term "vacuum" is used in connection with a steam heating apparatus it signifies that means are employed to relieve the apparatus of air, preventing its return and thus creating a condition under which steam will circulate at temperatures below 212 degrees.

The boiling point of water in a completed vacuum, then, being 98 degrees, and as water will not boil under

atmospheric pressure of 14.7 pounds until its temperature is 212 degrees, it may be said that the real boiling point of water is 98 degrees, and that if water does not boil at temperatures above 98 degrees it is pressure which prevents it. It follows, therefore, that the boiling point of water above 98 degrees is determined by the pressure exerted upon it either by the atmosphere or by steam within the boiler. The less the pressure the lower the boiling point. The greater the pressure the higher the boiling point.

It should be remembered, too, that the zero of the steam gauge does not mean that when the needle stands at this point there is no pressure in the boiler to which the gauge is attached, but that the pressure within the boiler equalizes that of the atmosphere at the sea level, i. e., 14.7 pounds. The real zero, therefore, is 14.7 pounds less than the registered zero on the steam gauge, under which condition there would be a complete vacuum within the apparatus. The measure of a vacuum, however, is always computed in inches. The figures, therefore, on the commercial vacuum gauge which is ordinarily used in steam heating plants signifies the number of inches of a vacuum that would be registered in a mercury column. With a complete vacuum the height of the mercury column is 29.22 inches.

Steam being water in a gaseous state occupies a space about seventeen hundred times as great as the water from which it originates, or, in other words, a cubic inch of water when converted into steam, if unconfined, occupies a space equal to about seventeen hundred cubic inches or about one cubic foot. When the conversion of water into steam takes place within an enclosed space, a steam heating apparatus, for instance, if the different parts of the apparatus are properly proportioned, the steam would fill the space in the apparatus not occupied by water were it not for the fact that this apparently unoccupied space is in reality fully occupied by air. When steam is heated above 212 degrees Fahrenheit. within an enclosed space, its expansion is about five times as great as air under similar conditions. nowing this, it is apparent that air, even though heated to an equal temperature, is much denser and heavier than steam, but when steam is generated in a steam heating apparatus, when the radiators, etc., are cold, the apparatus is full of cold air and, therefore, the density of the air is much greater than if it were hot.

Steam and air being of different density, will not mix, and the result is when steam is generated there is a pushing or a compressing of the air in the pipes and radiators, as the steam pressure increases. In order to allow the steam to circulate into and through the pipes and radiators, it is, therefore, necessary to provide outlets for the air, which we see in the air valves on each radiator or heating coil connected with the boiler.

When the air has been entirely expelled from the apparatus by the pressure of steam and the apparatus may be said to be full of steam. Since steam occupies a space about seventeen hundred times greater than the water from which it generates, it follows that the water from which the steam originated occupies a space of seventeen hundred times less than the steam; hence, when the steam is again condensed to water the space occupied by the steam will be left a void or vacuum, provided the air is prevented from returning into this space. If the condensation of steam or water were instantaneous, there would be little to recommend the vacuum system of steam heating, but the fact is that the condensation and loss of heat is gradual and can be checked and held at any point desired between atmosphere pressure with a temperature of 212 degrees Fahrenheit ,and an absolute vacuum with a temperature of 98 degrees by increasing the strength of the fire. The various degrees of pressure and vacuum and the corresponding boiling temperature of water between 10 pounds pressure and 29.22 inches of vacuum is shown in the following tables:

TABLE I

Showing Temperature of Steam, from Atmosphere Pressure to 10 lbs. Above.

Steam Gauge Pounds Pressure	Temperature of Steam or Boiling Point of Water
0 lbs. (atmosphere)	212° Fahrenheit
1 "	215° "
2 "	219° "
3 "	222° "
4 "	225° "
5 "	227° "
6 "	230° "
7 "	232° "
8 "	235° "
9 "	237° "
10 "	240° "

TABLE II

Showing Temperature of Steam, from Atmosphere Pressure to 14.7 lbs. below or 29.92 inches of Vacuum.

Vacuum Gauge Inches of Vacuum	Temperature of Steam or Boiling Point of Water	Vacuum Gauge Inches of Vacuum	Temperature of Steam or Boiling Point of Water
0 inches (atmosphere)	212° Fahr.	16 inches	175° Fahr.
1 "	210° "	17 "	172° "
2 "	208° "	18 "	169° "
3 "	207° "	19 "	165° "
4 "	205° "	20 "	161° "
5 "	203° "	21 "	157° "
6 "	201° "	22 "	152° "
7 "	199° "	23 "	146° "
8 "	196° "	24 "	140° "
9 "	194° "	25 "	133° "
10 "	191° "	26 "	125° "
11 "	188° "	27 "	114° "
12 "	186° "	28 "	102° "
13 "	184° "	29 "	100° "
14 "	181° "	29.92 "	98° "
15 "	178° "		"

It is apparent from a study of the above tables that, if any particular pressure either above or below atmosphere is maintained in a steam heating apparatus, steam at the temperature corresponding to that particular pressure can be circulated throughout the entire apparatus. The operator of a properly constructed vacuum system of steam heating has thus within his control variable temperatures within the apparatus, and as a result has a mild, healthy and comfortable heat to suit the variable external temperatures.

A strong trend in modern steam heating is undoubtedly toward the combined pressure and vacuum system, but the difficulty heretofore has been to find mechanical devices which would automatically permit the air to be expelled from the system, automatically prevent the waste of steam through the air vent and then positively and automatically prevent the air from going back into the system as the vacuum is created by the condensation of steam. A vacuum can, of course, be created either by the condensation of steam or by means of a pump, ejector, or some other mechanical device for the removal or exhaustion of air, but the method to be of value should first fill the heating apparatus (boiler, connecting pipes, radiators, etc.) with steam, expelling the air by steam pressure and then preventing the return of air to the apparatus.

Wtih a properly constructed vacuum system of steam heating there is of necessity a great saving in fuel. It is evident that it cannot require as much fuel to boil water at a temperature of 160 degrees Fahrenheit as it would at 212 degrees, and as there are a number of days during an ordinary winter when a temperature of 160 degrees in the radiator would be sufficient to maintain the desired heat in the building, it follows that a smaller amount of fuel can be used.

According to such a test on a small plant, where gas was used as fuel, the following table shows the consumption of gas per hour under pressure and vacuum, the temperature of the room in which radiators were placed

being maintained at 70 degees during the test.

FUEL TEST

Showing Gas Consumption per Hour Under Pressure and Vacuum. Room Temperature test under 70°.

212°	60	feet	Gas	per	hour	0	ins. vacuum
200°	50	"	"	"	"	6	"
190°	39	"	"	"	"	10½	"
180°	29½	"	"	"	"	14½	"
172°	27½	"	"	"	"	17	"
157°	24	"	"	"	"	21	"

Summarized the test would seem to show that the apparent advantages of an efficient vacuum system of steam heating over an ordinary system are:

First.—A range of temperature from 100 degrees to 240 degrees (10 pounds steam pressure) within the apparatus to suit any external temperature.

Second.—Economy in fuel.

Third.—Economy in labor.

Fourth.—Greater physical comfort of the inmates of a building so heated, because of the fact, if properly controlled, the heat is always right no matter what the outside temperature may be.

It would thus appear that if the apparatus can be entirely vented of air and filled with steam, and then the air prevented from going back into the system when steam pressure is reduced below that of atmosphere, the entire system can be operated either under pressure or under vacuum at the will of the operator.—GEORGE D. HOFFMAN.

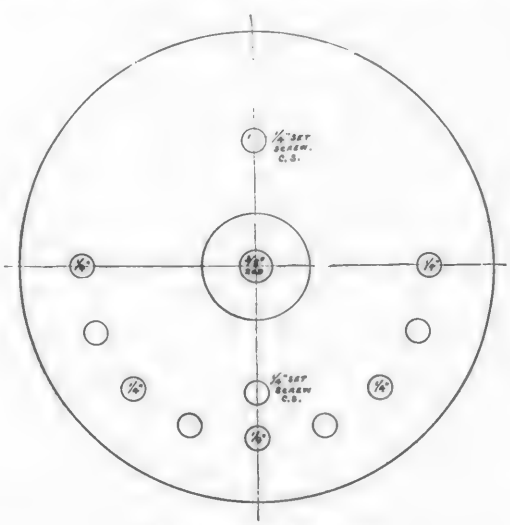
HEATING AND VENTILATING A LARGE CITY HOSPITAL

An interesting type, in many respects, of the heating and ventilating of a city hospital is to be seen in the plant installed in the Norwegian Lutheran Deaconesses' Home and Hospital, in Brooklyn, N. Y.

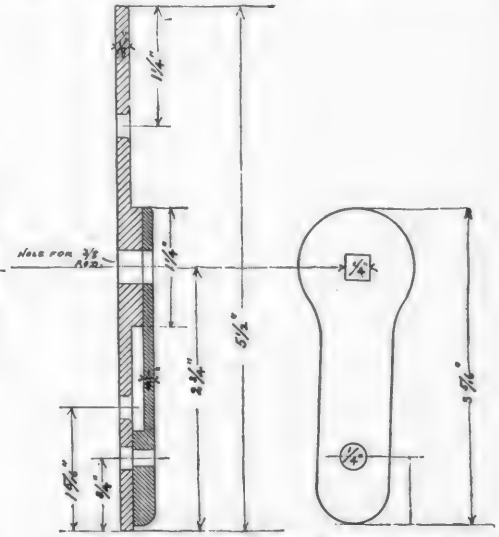
All of the radiators in the building are not only enclosed in sheet iron, but are so placed flush with the walls that but a single plate of sheet metal is exposed to view. This arrangement serves the double purpose of preventing the collection of dust behind the radiators and of avoiding the overheating of the radiating surfaces.

A feature of the ventilating apparatus, which provides for both mechanical and natural draughts, lies in the disposal of the foul air from the contagious and infectious wards. This foul air is carried through a duct to the chimney, where it is subjected to the heat of the gases from the boilers, thus destroying what germs are contained in it.

The construction of the ventilating ducts along the roof of the building was done with a view to the possible



TEMPERED AIR DUCT

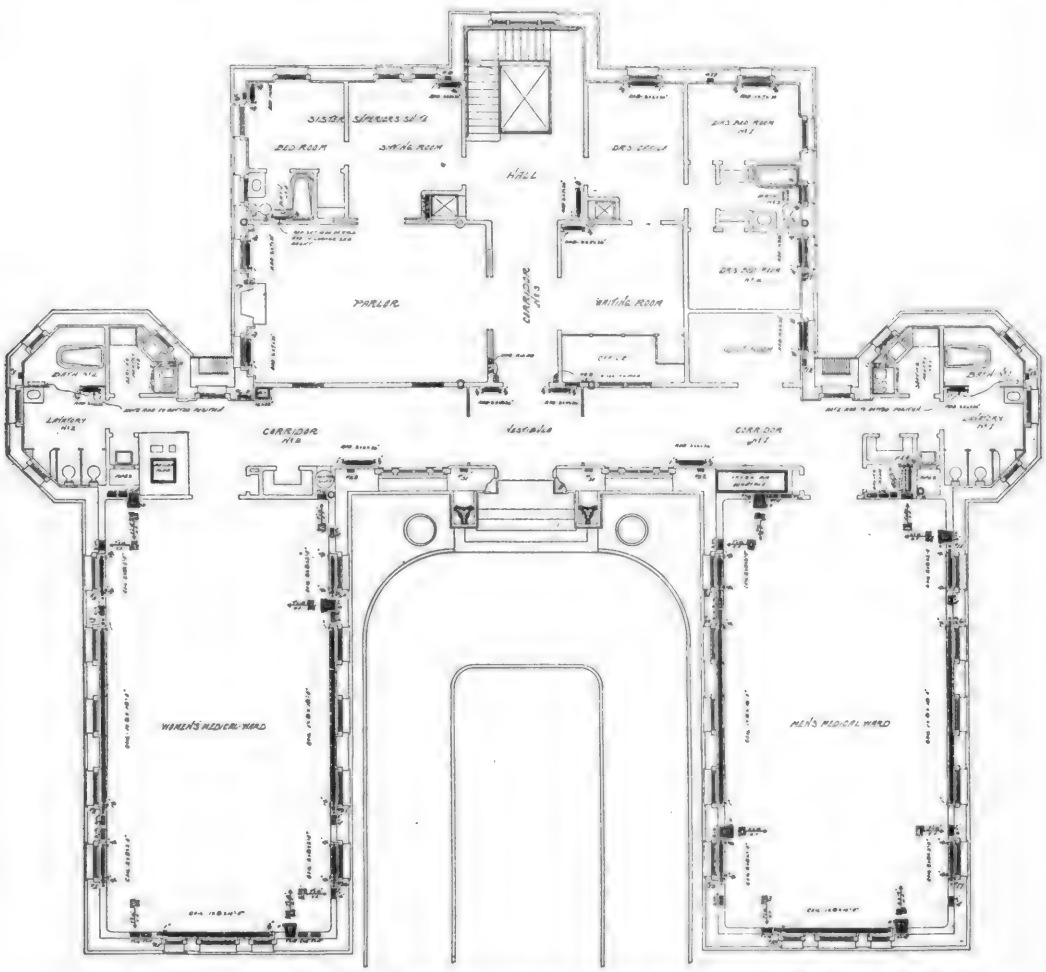


SECTIONAL VIEW SHOWING DAMPER OPERATING DEVICE

extension of the system in case additional stories were added at any time. The building at present contains a basement and three stories, all of which are heated by direct radiation in the manner described. Steam is furnished by two 3x12 foot boilers. which besides heating the building, has a separate steam and return line for heating the tables in the serving room and another line for supplying heat to the sections of the tempering coils of the ventilating apparatus. Still another line and connections, not shown on the accompanying plan, were installed for the laundry fixtures. Heat is also furnished to two hot water tanks for domestic purposes and for warming a stable in the rear of the hospital.

The ventilation is furnished by taking fresh air from the roof through a fresh air chimney to an air chamber in the basement. This chamber is connected with a 110-inch blower, run by a $7\frac{1}{2}$ H. P. belted motor, alternate current. The arrangement of blower and fresh air chamber is such that the air can be either forced by the blower through the tempering coils, which may or may not have steam in them, as desired, or through a by-pass, the air may reach the rooms by natural draught. The ventilating ducts for the supply of fresh air to the main rooms are shown on the plan.

Vitiated air is removed by two fans, one a 21-inch disk fan located in the basement for the ventilation of the contagious wards and the infectious and special case wards. The discharge from this fan is into the boiler flue



NORWEGIAN LUTHERAN DEACONESSES' HOME AND HOSPITAL, BROOKLYN, N. Y.
PLAN OF SECOND STORY, SHOWING INSTALLATION OF RADIATORS FLUSH WITH WALLS

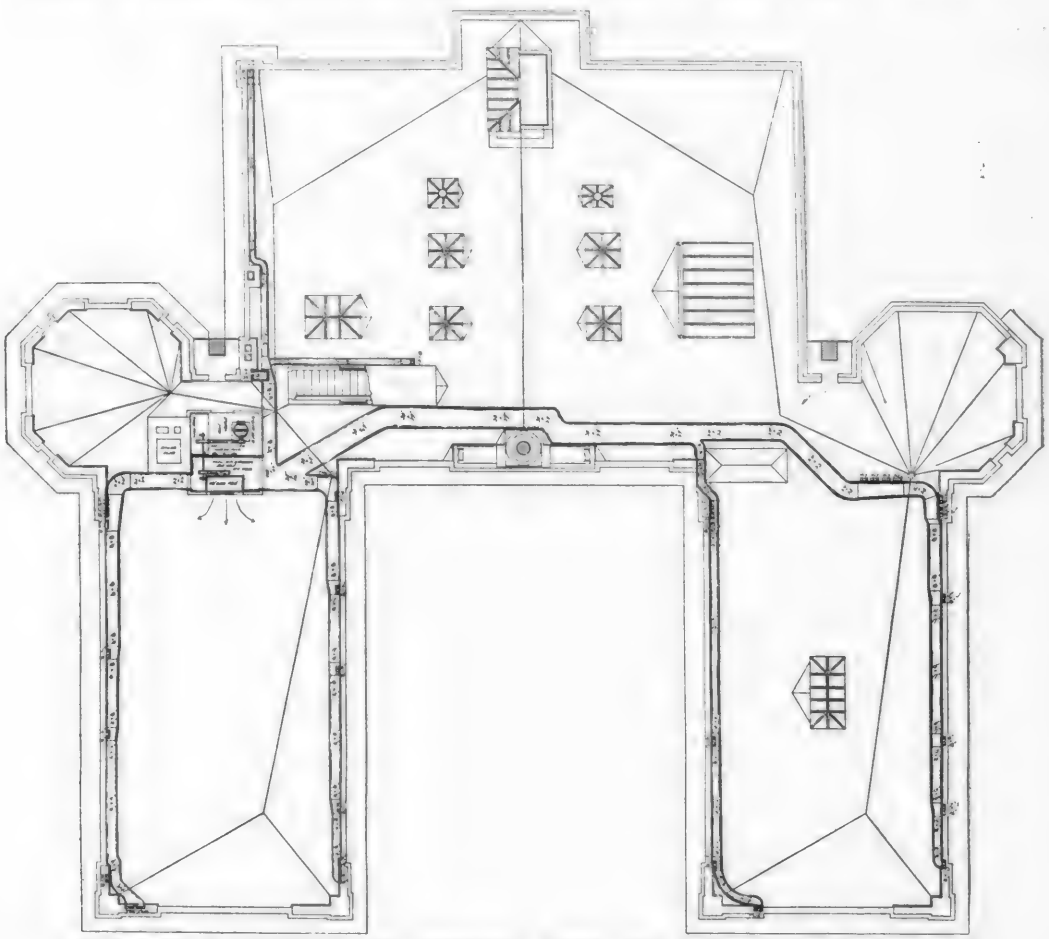
in the basement, as has been noted, the final point of discharge being on the roof, 70 feet from the fresh air inlet. The ventilation of the remaining portion of the building is accomplished by means of a 48-inch disk fan and a 2 H. P. motor placed in a pent house on the roof.

Ventilating ducts for the first system mentioned are all carried along the basement ceiling. The ventilating ducts and flue of the second system are carried to the roof where is placed the main sheet iron duct, leading to the fan located there. These ducts are covered with gravel roofing. None of the outlets or inlets of the heating and ventilating flues was provided with registers or register faces, having nothing but open mouths. In the case of the heated air flues, the inlets and outlets were carried up to a height of seven feet above the floors, where they were turned out into the rooms by the use of an elbow, provided with a damper, operated by means of a quadrant placed upon the wall in the room to be manipulated by hand.

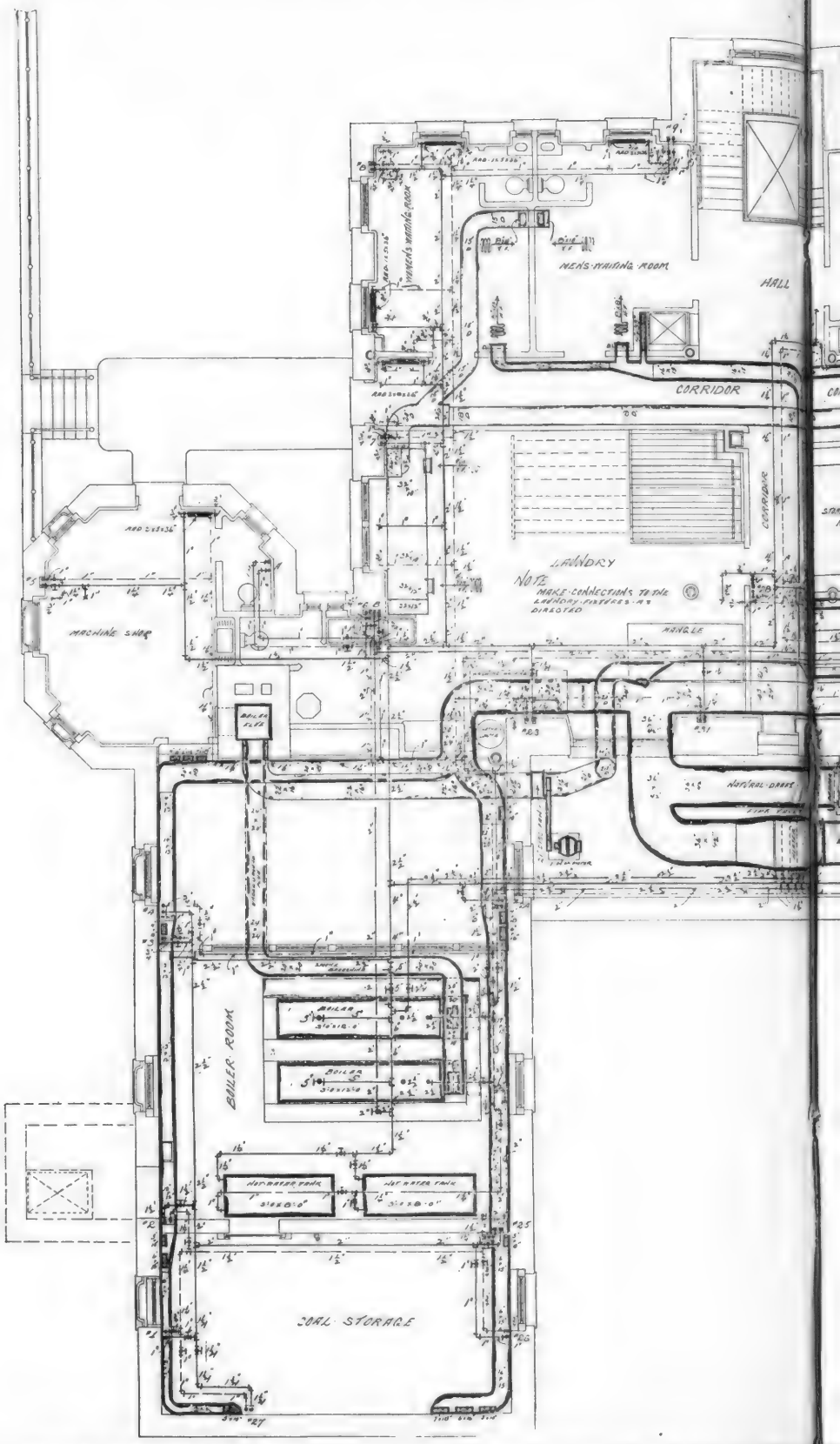
The ventilating flues and ducts for the contagious and infectious wards are of tile pipe laid underneath the ground, which are carried to a pipe vault in which the ventilating fan is located, before rising out of the ground. From that point the ducts are of galvanized iron.

Tile pipe laid underground is also used on part of the remaining portions of the building for those rooms located in the basement—the waiting, treatment and store rooms.

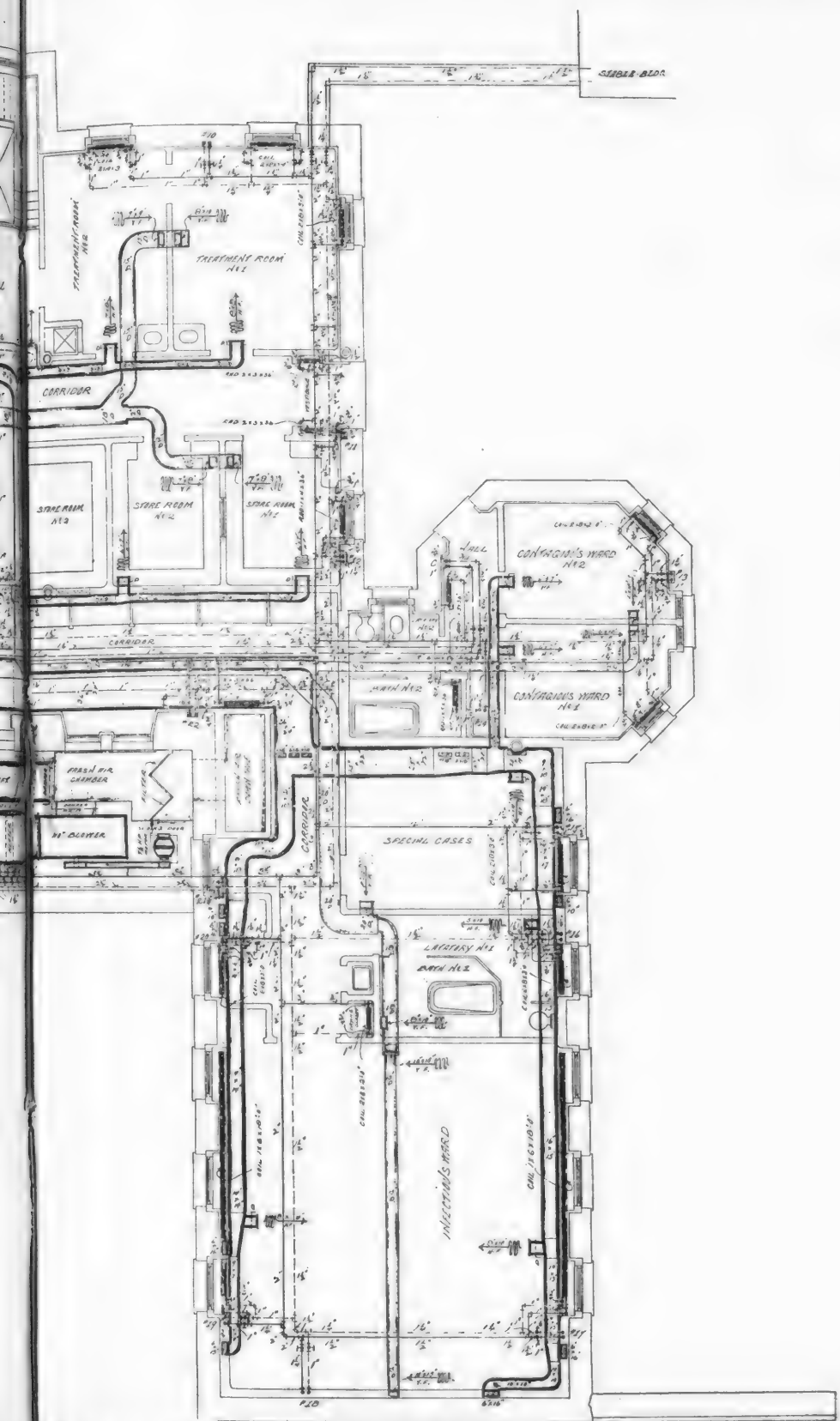
Messrs. Hill and Stout are the architects of the hospital, and the constructing engineers were Blake & Williams, of New York.



NORWEGIAN LUTHERAN DEACONESSES' HOME AND HOSPITAL, BROOKLYN, N. Y.
PLAN OF ROOF, SHOWING ARRANGEMENT OF VENTILATING DUCTS



PLAN OF BASEMENT, NORWEGIAN LUTHERAN DEACONESSES' HOME AND HOSPITAL



TAL, OKLYN, N. Y. SHOWING ARRANGEMENT OF STEAM MAINS AND VENTILATING DUCTS

THE HEATING AND VENTILATING MAGAZINE

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REPRODUCTIONS of plans showing the system of ventilating ducts in basements of buildings indicate the complicated arrangement that is necessary, not only in installing the ducts so that they will do effective service, but also allow the other installations, such as the steam or hot water piping, to perform equally effective work. This requires no little amount of time and thought and planning. It has also led some of our more progressive engineers to devise ways and means of overcoming this handicap. It has been suggested in more than one quarter that the advice to dock a dog behind his ears applies with equal force in the matter of ventilating ducts. This view is taken both for the reasons stated and for the additional reasons that ventilating ducts, besides clogging up the basements, are proving worthy successors of the hot air pipes used in furnace heating as being first-class receptacles of dust and other breeders of germs. An engineer, who is somewhat of a pioneer in a movement away from the existing order of things, says that a recent investigation of a ventilating plant that has been in service some years led him through ducts that were not only inches deep with dust, but had long been the domicile of a healthy and progressive family of rats.

ONE might ask, with pertinence, "Well, what are you going to do about it?" And it must be admitted that in many, if not in most, cases, the architect or engineer has no alternative but to proceed in the way he has gone. This is especially true in buildings, in which the heating and ventilating engineer is the last man to be consulted, where the power plant is placed here, the refrigerating apparatus there and the ventilating arrangements made to fit the spaces left vacant. Occasionally, however, where the placing of all the apparatus rests with the constructing engineer, an opportunity is presented which already has resulted in an advance in the arrangement of ventilating systems that is worthy of more attention than has been given it. In a number of city residences that have come to our notice and in at least one larger building, all of which are equipped with artificial ventilation, an inspection of the basement is likely to elicit the query, "Where are the ducts?" As far as the residences are concerned, the ducts have been practically eliminated through the construction of false walls on each side of the basement, running the length of the building, and forming tunnels probably five feet wide in which is lo-

cated all of the necessary apparatus. In the case of the larger building the foundation walls are broadened to admit of a space within to serve as an air duct.

The question of economy does not enter into this arrangement. Indeed, it is doubtful if there is any apparent initial saving. The aim seems to be the elimination, to as large an extent as possible, of sheet metal for ventilating purposes, and if the arguments in support of this stand can be borne out by the facts, the subject is one that is likely to prove of growing interest to ventilating engineers.

A REFERENCE in our last issue to the lack of standard sizes for catalogues and other publications issued by manufacturers and jobbers of steam fitting goods and the utility of such standards has met with a surprising unanimity of support on the part of the trade. In every quarter heard from the suggestion has met with unqualified approval, and it has been found that more than one manufacturer is now adhering to the standards set in certain other similar lines. The plan has, in the past, come up sporadically for discussion, which has been allowed to subside through the absence of personal initiative.

An exception might properly be made in the case of those who for some years have advocated a card index system and have lived up to their convictions by maintaing card index catalogues in their own business. Here a beginning was made that deserved better things and we believe that to-day the time is even more ripe for the discussion among manufacturers as to the adoption of this system or of one that will have equally good features. We note with interest that the subject was on the program for discussion at the recent meeting of the National Convention of Stove Manufacturers. We should be pleased to receive additional expressions of opinion from our readers upon this subject.

IN this connection we are pleased to see that our suggestion has found an echo in some of the other trade journals. *Canadian Machinery*, for instance, in its May issue, which has just come to hand, has the following to say upon the subject:

"A crying demand exists to-day for a uniformity in the sizes of catalogues and booklets, yet often the very men who realize the necessity are the most culpable when the matter of bringing out their own catalogue is before them. To keep a presentable file of the heterogeneous mass of the literature issued by the various manufacturers—sometimes of the most valuable kind—is beyond the range of possibility. Anyone receiving a number of catalogues cannot fail to have this borne upon him, and with the additional thought that every firm must take a peculiar delight or make a special aim to have their catalogues of a size different to any other. A concerted effort on the part of manufacturers would meet with general approval and it is hoped that before long such a reform will be effected.

"The standard sizes approved by some of the most prominent engineering societies in America are 3½x6 inches, 6x9 inches and 9x12 inches, which gives ample range for any line of output. Not a few of the larger manufacturers have taken this matter in hand in using one or other of these sizes, and more are bound to follow their example. Those in

pamphlet form, suitable for insertion in cloth binders, meet with popular favor, and who can tell the influence on the mind of the prospective buyer in carrying out this idea. It costs little, if any, more, to adopt a uniform system and the satisfaction to the recipient is increased an hundred fold. When the millennium is reached in this respect the manufacturer, the engineer or the artist may collect an industrial library in which he can take a pride, instead of as at present being forced to place his catalogues in some hidden corner that none may note the unkempt appearance begotten by a multiplicity of shapes and sizes.

"THE best laid plans of mice and men gang aft agley," and so do those of the designing engineer when he does not supervise the work. This has been illustrated quite recently in New York in a manner that once more raises the important question as to the relations of the designing to the constructing engineer. It would seem that the time must come when a man who designs the entire heating apparatus of a building will feel that it is to his best interest not only to inspect the plant during the course of construction, but to see that it is not allowed to pass into the hands of the owner without satisfying himself that the installation has been properly made. The fact that a building in which no expense was to be spared in any feature of its construction, contains, nevertheless, a far from satisfactory heating plant discloses a condition of affairs that should not be allowed to continue.

This does not imply that a defective plant, installed under these circumstances, is necessarily due to the work of the constructing engineer. Very often there are faulty features in the design that on paper looks entirely practicable and which the designing engineer would not only notice in an inspection of the installation, but would be only too glad to remedy while there was yet time.

Secrecy in Technical Work

It has been generally recognized for some years that the day of secrecy in business was past, says *Engineering Record*, but the publicity of late has nevertheless been surprising. Those who are engaged in the work of developing a process or a machine are aware that sooner or later most of the facts concerning it leak out. A recent union of tanneries showed that the jealously guarded secrets of each plant were well known to all the others. Lack of publicity had forced the managers of each plant to work out the problems for themselves at considerable expense. The same thing is probably true in most industries. The discovery of natural laws that one man makes another can also make, and the machine that one man invents can be designed by another. The protection of the Patent Office is better than that of guarded doors, and the cooperation of a loyal staff of good men is better than the old-fashioned organization patterned after the seclusion of a prison.

It is interesting to observe that the companies which are introducing new machinery and products most extensively and successfully are generally those that are the most ready to make public all the facts connected with the manufacture. They rely on excellence of design and character of workmanship to assist in the sales of their products, and they welcome publicity concerning such features. If information is withheld by them concerning some machine or some process it is because the company itself is not assured that the information can be given with certainty as to its correctness, and it does not care to stand sponsor for incorrect or misleading announcements. The strongest companies to-day are not those which have the most secrets, but those which have the best men. It is not ability to discover and then hide some new process which spells success so much as the ability to discover and utilize it to the full, attracting attention to its advantages and safeguarding its possession by the legal methods authorized in all civilized countries for the purpose. The ability to take the most complete advantage of an invention or a discovery is a matter of human nature, and men, not secrets, form the best asset of any company.

TOPICS OF THE TRADE

Reports from the Middle West tell of the increasing number of central heating plants that are being installed in that section. The idea is being adopted not only in cities, but in the larger country towns. Most of these plants are conducted in connection with the electric light stations, the exhaust steam from the latter being utilized for heating water for a hot water service. Paxton, a town in Illinois, has a hot water system of this sort which is supplying heat to eighty-five patrons. A charge of 20 cents per square foot of radiation a year is made. Bloomington, Ill., is equipped with both a steam and hot water service.

Mr. J. D. Sutcliffe, managing director of the Sutcliffe Ventilating & Drying Co., Ltd., Manchester, England, who is one of England's well-known ventilating engineers, has just returned home after a visit of several weeks in this country. While he found many features of the art during his travels here that were new and interesting to him, he was somewhat disappointed at the progress we have made on the subject of drying. In England Mr. Sutcliffe says the art of drying has been reduced to so fine a point that the precise temperature and humidity required for the drying of different articles is well known and in general practice. It has been found, for instance, that the temperature and humidity required for drying leather and similar goods is not at all the same as that for wood, paper and any of the other products that require artificial drying. Mr. Sutcliffe found no methods of that sort practiced in this country and in no drying room did he find any apparatus for dealing with the temperature and regulating it.

Speaking of the use of American goods in England, Mr. Sutcliffe had warm words of praise for the American manufacturer, who, he said, was able to turn out a finer class of cast-iron goods than were made in England. "The castings come away cleaner cut," said Mr. Sutcliffe, "than anything produced abroad." As a result the use of American cast-iron goods in England is already large and likely to grow larger. Mr. Sutcliffe thinks the question of humidity a serious problem in American dwelling rooms, and feels sure that a temperature of 62 degrees in England is equal in comfort to a temperature of 72 degrees here, and this is entirely due to the different hygrometrical conditions.

The use of steam heat in the mining of sulphur is a development that is attracting the attention of many heating engineers in the Southwest. An average daily yield from a sulphur mine is from 200 to 350 tons of sulphur, ranging from 85 to 95 per cent. pure. It was always a slow and dangerous process to mine sulphur according to the old French style of sinking shafts and working the drifts, as the men often succumbed to the poisonous gases arising from these subterranean passages. Thereupon they began to experiment with a process for wetting the sulphur in the shaft and pumping it in its liquid state to the surface. They now have this process perfected and when sinking a well or shaft for sulphur they go about the business in the same ordinary manner of drilling for water or oil, using a drill with butt of the required dimensions, going down some 600 or more feet. As soon as sulphur is located the steam and hot water process is turned on, allowing this to continue from twelve to twenty-four hours when the contents are pumped to the surface into large vats built for the purpose of cooling the fluid. A well is thus heated and pumped alternately until the sulphur supply is exhausted.

CORRESPONDENCE

Card Index System for Catalogues.

Editor HEATING AND VENTILATING MAGAZINE:

We were interested in reading your articles in the last issue on the question of establishing a standard size for catalogues. Thinking, perhaps, you might be interested to learn what we have been doing for the past two years in that direction, we inclose one of our filing cards, also a folder containing a list of all the different specialties we manufacture. You will notice the filing card is of the standard size and will file in any cabinet of that size, and if a party receiving it should not have a standard cabinet, they can be purchased in nearly every book and stationery store for the moderate sum of $3.00, having four drawers and room enough to file about 3,000 cards.

We will explain, in our line, we have about five classes of persons that are most interested in our manufactures, namely, mechanical engineers, heating and ventilating engineers, the steam heating trade, jobbers and consumers, and we are guided somewhat in our answers to their inquiries.

You will notice the filing card contains a cut of the subject and a brief description of its workings, also a full list of the capacity of the different sizes and the shipping weight, this being about all the information that the engineers and the jobbers care to have. When they write for information in relation to any of our goods, we send them the filing card of the goods referred to, and one of the folders, so that when they receive the card, we assume they may be interested enough to glance over the folder, and if they do, they may see another subject that would be of interest to them, in which case they would request us to send them cards on that subject as well. They can then throw the folder into the waste basket, and file the cards that they are interested in in their cabinets for future use.

To illustrate, supposing the engineer is preparing a specification of a certain steam system in which there are several steam traps of various sizes to be used, and he wants to specify them by numbers, or capacity; instead of looking up a circular or catalogue that he has on file somewhere among his collection, he simply pulls out the cabinet drawer, and from behind the guiding card, "Steam Traps," he takes the card having all the desired information on it. This ordinarily will be all the information that he requires, for in reading the different trade papers he learns in a general way, from their description, the construction of all the principal steam traps on sale. This will apply to the jobber with the exception that the jobber is in no way interested in the construction. All that he cares about is to make the sale and get his commission. In the two years that we have been using this system we have no recollection of a jobber asking for the special circular containing the full information.

With the steam heating trade and the consumer it is slightly different, as they usually want to learn all about the setting, etc., and we usually send them, on their first inquiry, the filing card and the special circular of the subject they are inquiring about, with the folder as well.

We will add that during the time we have had this system in use, we have received over 200 letters, mostly from engineers, commending the system, and we feel that if it could be made more genral, that the manufacturer as well as his customers, will be greatly benefited by it, both in the saving of time and money. We have tried to make it more general, and when we first adopted it, we felt sure that many other manufacturers would also adopt it. They need not be confined to the smallest size filing card, as there are two other larger standard size cards that they could use.

We wish to further add, we stand ready at any time to drop our system and cooperate with any parties having a system that will produce the desired result. However, thus far we know of no better system for our use.

JAMES H. BLESSING,
Secretary, Albany Steam Trap Co.
Albany, N. Y.

Pipe Hangers.

Editor HEATING AND VENTILATING MAGAZINE:

In the current edition of your magazine there is an article in your correspondence columns headed "Pipe Hanger." As we are interested in goods of this character, the article had our careful attention and it is so misleading to the trade in general that we feel called upon to write in regard to it.

We would judge from this letter that the writer was a practical man, familiar with steam heating work, but he seems to be unaware of the fact that there are numerous expansion hangers that are made and which have been on the market for a number of years which will hang pipe in a very much better manner than the way he suggests, and, moreover, very much more cheaply.

In his article he states that by flattening a piece of pipe, boring a hole in it and then fastening it to a wooden beam with a lag screw, you will save a great deal of time, as you will not have to

bore a hole in the beam for a lag screw. In the first place, it would not be necessary to drill any hole in this beam for a small lag, as the expansion hangers which are on the market are fitted with gimlet pointed lags which can be screwed in by a wrench. Even if it were necessary to drill a hole it would not take one-quarter of the time it would to use the hanger he suggests, and if it were necessary in one case to drill a hole for the lag screw, why would it not also be necessary to drill one for the lag he uses? Four of the ordinary expansion hangers could be put up and the pipe hung while your correspondent was getting one of his ready.

We are unable to make any comment on the body part of the hanger mentioned owing to the fact that we cannot tell from the sketch just what his idea is, but, as near as we can grasp it, the pipe fits into a hole making a rigid joint, and there would be absolutely no play or chance for expansion. An ordinary expansion hanger of average size would have a lag screw, possibly ½ inch in diameter, which would be neat in appearance, whereas, for the hanger suggested, a one-inch pipe certainly would look very clumsy, and, moreover, would make the body part of the hanger clumsy, for it would be necessary to have a socket at least 1½ or 2 inches in diameter.

We have no desire to criticize your correspondent in this matter, but his article is so misleading to the trade in general that we feel called upon to make comment on it, owing to the fact that there are many makes of well-known expansion hangers that are in general use, in fact, anything but the regular expansion hanger is now an exception.

We would be glad to refer this gentleman to several manufacturers of these goods if he so desires.

H. H. HELLERMAN,
President, Penn Engineering Co.
Philadelphia, Pa.

STANDARD SIZES FOR CATALOGUES

Reference in our last issue to the lack of a series of standard sizes for catalogues in the steam and hot water fitting trade has brought to light a heretofore silent sentiment upon this subject that seems to indicate not only the timeliness of the suggestion but the readiness of many manufacturers and jobbers, as well as others who make use of trade catalogues, to co-operate in any plan looking towards uniform action in this important matter.

It may be said to be practically the unanimous opinion of the trade that the present manner of issuing trade catalogues is open to improvement. It may also be said to be the opinion of a vast majority in the trade that while a card index system might be the most useful and, perhaps in the end, the ideal system, the difficulty of securing its establishment and its faithful observance after it is established is an important point to be considered. The point is also taken by many that while the card index system in some ways is a time saver, its initial establishment and the constant care necessary in its successful operation present features which, at first glance, do not appeal to the busy tradesman, who is unwilling to trust his office boy to attend to this work and must needs spare either some of his own time or that of his clerical force, if the system is to be maintained in an up-to-date manner.

There are at present a number of manufacturers of steam fitting goods who are adhering to the standards set by the American Railway Master Car Builders' Association and the American Society of Mechanical Engineers. They are as follows:

3½ x 6 inches.
6 x 9 inches.
9 x 12 inches.

According to these standards books corresponding to the average jobbers' catalogues measure either 6x9 inches or 9x12 inches, according to the goods illustrated or the amount of matter contained in them. One or the other of these two forms, it is said, will accommodate the various sizes of cuts or diagrams or tables now contained in books of intervening or larger sizes. The standard of 3½x6 inches is intended to accommodate in an ordinary envelope all miscellaneous matter, such as circulars, souvenirs, post cards, or any other trade literature that is intended for handy use and possibly pocket reference. Matter of this sort is also suitable for publication in the 6x9 inch size, when it is intended to be filed with the regular 6x9 inch publications.

The merit of this system is obvious. In the first place, the sizes of the filing shelves are reduced to two. The arrival of new trade catalogues conforming to these sizes always find places awaiting them. In addition, the shelves at all times present a neat and attractive appearance and the books are easily accessible to any one who desires to use them.

It is possible that in the steam and hot water fitting trade other sizes might from time to time be found desirable. As a working basis, however, the standards referred to in the opinion of many, have much to commend them.

Meanwhile it is interesting to note the various methods employed in an effort to handle the present variety of catalogue sizes. In this connection the sectional bookcase man is in his element and in a number of offices bookcase units on a graduated scale are employed with more or less success. One enterprising book-

case manufacturer has devised a cabinet that includes not only facilities for stowing away catalogues of any size or shape, but has a card index arrangement that goes with it and serves as a guide to the contents within.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

The eyes of heating and ventilating engineers are already turning towards Chicago, where the mid-summer meeting of the society is to be held July 7 and 8 next. Headquarters will beat the Auditorium Hotel, which will grant special rates to members and friends of the society. Secretary William M. Mackay reports an interesting lot of papers and topics in preparation.

The Auditorium is well known as Chicago's largest and best equipped hotel. It is located directly on the lake front on Michigan avenue, and is within easy reach of the railroads and of the business and amusement districts.

Some idea of the scope of the work laid out for the committee of the American Society of Heating and Ventilating Engineers appointed to collect furnace data may be obtained from the series of questions the committee has formulated upon this subject, which have been sent to the members of the society for reply. The committee is composed of President William Kent, Frank K. Chew and C. E. Oldacre.

The questions are as follows:

1. What rule or formula would you use for obtaining the following: Heat lost by conduction and radiation from buildings through walls, windows, roofs, etc.? Heat lost by warm air escaping from the building?

2. The sum of these two losses is the total heat that must be supplied to the circulating air by the furnace. What quantity of air should be passed over the furnace in order to absorb this amount of heat? Have you a formula or rule for obtaining this?

3. Suppose the outdoor temperature is zero and the temperature of the hall or other part of the house from which air may be drawn into the cold air box is 60 degrees, what proportion of the air would you draw from the outside and what from inside in an ordinary dwelling house of 8 to 12 rooms?

4. How would you calculate what would be the maximum temperature of the air passing over the furnace? Do you consider this the most advisable temperature of the air at the outlet?

5. What rule or formula have you for proportioning the extent of the heating surface of the furnace to the maximum quantity of heat to be given to the air by the furnace?

6. What rule have you for diameter of fire pot, depth of fire pot, diameter of grate and for maximum rate of combustion per square foot of grate surface per hour?

7. What rule have you for determining area of pipe admitting cold air from outdoors? If pipe is used for inside circulation, what then?

8. What rule have you for area of heater pipes leading from furnace to first, second and third floors?

9. What rule have you for the sum of the areas of all the air outlets of the furnace?

10. What rule have you for the area of the registers?

11. What preference have you as to the location of registers in different rooms?

12. What is your rule for area of foul air outlet from the house?

13. What method have you for insuring entrance and circulation of warm air in every room, particularly those on the side of the house exposed to the strongest cold winds?

14. What is your opinion of warm air heating where a positive means of circulation is used, including both inlet and exit pipes for every room? Do you know of any examples, and where?

15. Design a system of heating by warm air for the accompanying floor plans under the following conditions: The house fronts to the north and the prevailing cold winds are northwest; the lowest outside temperature is 20 degrees below zero. The library has a grate for a wood or coal fire. The house is well built; the windows in the north and the northwest rooms are double. All windows and doors are provided with weather strips and are as air tight as they can be. Show the location of furnace and location and sizes of all pipes for fresh air, warm air, air circulation out of rooms and foul air exits, size and location of registers. The kitchen and laundry and the two unfinished rooms on the third floor are not supposed to be heated. Give a rule, a reason or formula for the adoption of every detail.

16. Do you live in a furnace heated house? If so, can you furnish any experimental data obtained from the heating system, such as the following:

In extreme cold weather what is the temperature of air outdoors, temperature indoors in different rooms. Size of building. Cubic contents of rooms. Exposure. Number of pounds of coal burned in 12 hours daytime and 12 hours night. Number of pounds of coal burned per season. Temperature of air entering furnace. Temperature of warm air at several registers. Velocity of air in flues and through the registers. Area of inlet and cold air from outdoors. Area

of inlet from hall or other parts of the house.

17. What are the principal faults that you have found in warm air heating installations when they have been incorrectly installed?

18. Please suggest any other questions or any modification of the above questions which would tend to bring out useful data in regard to warm air heating.

NATIONAL ASSOCIATION OF MASTER STEAM AND HOT WATER FITTERS

June will be a notable month in the steam and hot water fitting fraternity, on account of the annual convention of the National Association, which will be held at Atlantic City, N. J., June 12 to 15 next.

HENRY L. HALL
Twice President of the Master Steam Fitters' Association

The association, under the administration of President Henry L. Hall, has experienced a notable development during the past year that is a cause for gratification not only on the part of its members, but of the trade generally.

Reports published in the association's *Official Bulletin* from time to time show a rate of increase in membership which if continued up to convention time will break all records in the history of the organization. This work has been in the hands of Special Organizer William A. Davis, acting under the direction of the president.

The New York State Association held its annual meeting May 9 last at Buffalo, N. Y. Officers were elected for the ensuing year as follows: President, Frank H. Falls, Rochester; vice-president, Frank Dobson, New York; secretary-treasurer, Charles A. Criqui, Buffalo; sergeant-at-arms, William Milligan, Rochester. The new board of directors is composed as follows: Frank Dobson, New York, chairman; William H. Gaylord, Binghamton; Charles Geiger, Buffalo; John A. Creelman, Rochester; Edward F. Joy, Syracuse, and William C. Vrooman, Schenectady.

NEW DEVICES

To Prevent Rust in Sectional Boilers

Up to a recent time all vertical cast iron sectional boilers were made with considerable flat surface between the section to form smoke flues and to prevent short fire travel. This accomplished the purpose for which it was intended and had no unfavorable features so long as there was a fire in the heater. During the summer, however, when the boiler was not in use, standing in a damp basement and containing more or less water, rust formed between the sections, expanding them and forcing them apart, and in time breaking the joints or the sections themselves.

This has been a common experience in all vertical sectional boilers, and many methods have been employed to prevent it, such as placing sheet asbestos between the sections and using larger nipples on the sections and cleaning and oiling them in summer.

While all these methods helped the life of the boiler and delayed the possibility of leakage, it did not seem to be a complete remedy. A device recently patented by Hart & Crouse Company constitutes the cutting away of all the flat surface between the sections, allowing two sharp edges to meet in place of the former flat surfaces. This device has already been thoroughly tested and has been found to effectually prevent the accumulation of any matter between the sections.

BLAKE & WILLIAMS, New York, are installing a steam fitting and ventliating plant in the Essex County Isolation Hospital at Belleville, N. J. Owing to the use to which the building will be put in the treatment of contagious cases of the most dangerous character, both the heating and ventilating plans have been drawn with special care.

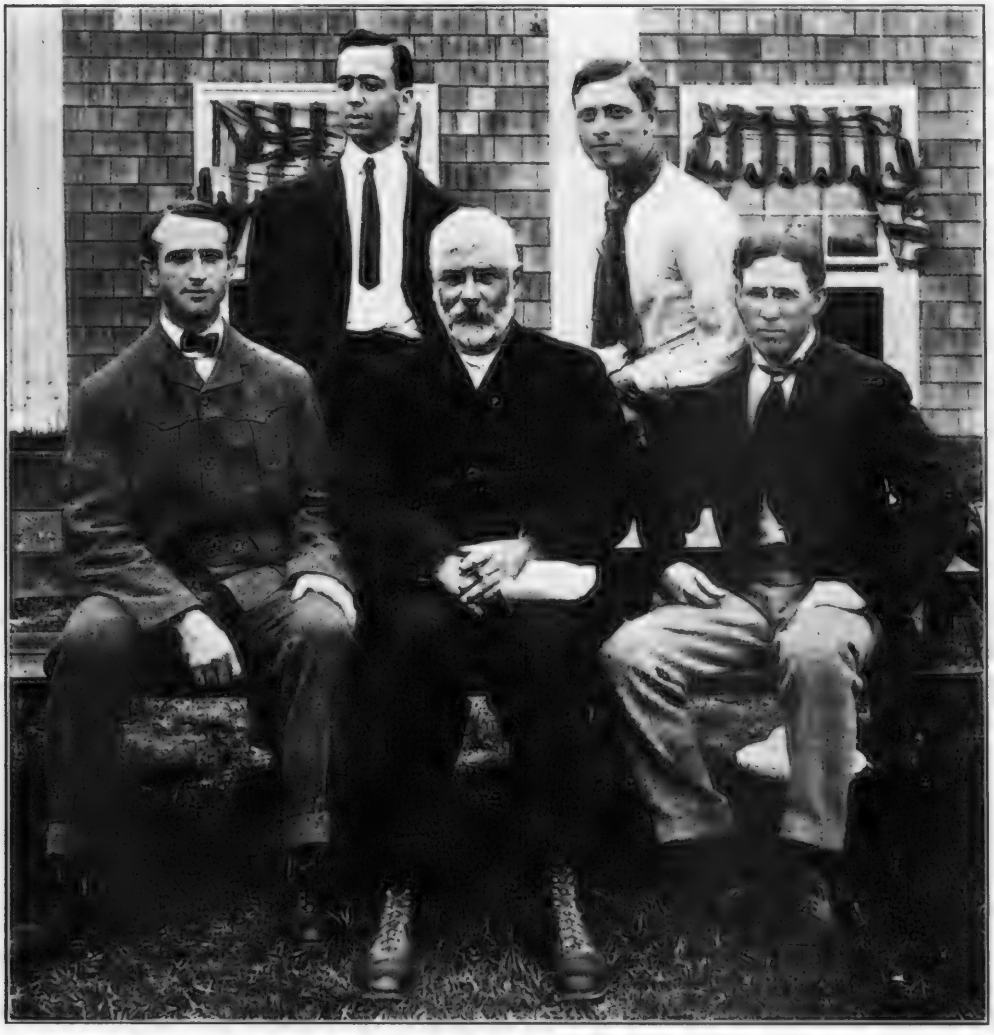
Eastern Trade Golf Association's Approaching Tournament

Several features will contribute to make the approaching meet of the Eastern Trade Golf Association, on the links of the Atlantic City Country Club, a notable one. It is to be held June 12 next, on the opening day of the convention of the National Association of Master Steam and Hot Water Fitters, and at the same place. This will enable many of the members to be present who might otherwise be obliged to forego the trip. Arrangements are also being made for an additional competition in which only visiting steam fitters and members of the Western Trade Golf Association will be eligible.

Last season two team matches were played between teams representing the Eastern Trade Golf Association and the New York Master Steam Fitters' Association, each team winning a match, so that if a competition is arranged at Atlantic City, it will be the deciding match of the series.

So much interest in the tournament has been aroused that many of the more enthusiastic golfers are planning to go to Atlantic City a day or two in advance of the tournament to get a line on the course. On this account it is likely that the first evening of the Steam Fitters' convention will see a comparatively large attendance.

The Association has an enrollment of 75 members, over half of whom are expected to take part in the coming games. There will be a cup for the best gross score of the morning, and probably other prizes for the winners at the match play in the afternoon. Play will begin at 10 o'clock A. M



Walter S. Appleton, Secretary Frank H. Simmons
Frank B. Barrett, Captain P. R. Jennings, President Frank C. McLain, Treasurer

GROUP OF EASTERN TRADE GOLF ASSOCIATION CRACK PLAYERS

TRADE AND MISCELLANEOUS NOTES

We shall be pleased to receive and publish in this column news items of interest relating to the different subjects covered herein.

EDWARD ALLEYNE SUMNER, at one time manager of the Detroit branch of the American Radiator Co., died at St. Augustine, Fla., April 27 last. Mr. Sumner was 65 years old. He served through the Civil War as first lieutenant in the Forty-third Massachusetts Volunteers. He retired from business eight years ago.

Miscellaneous Notes

CARNEGIE TECHNICAL SCHOOL building, Pittsburg, Pa., will be equipped with machinery amounting to 650 horse power. Plans for the heating, lighting and power plant have been recently submitted to the school committee by the architects, Palmer & Hornbostel.

NICHOLS-RITTER REALTY COMPANY, St. Louis, Mo., is reported to have launched a big building project in the shape of the erection of a number of houses to cover 1,000 feet frontage on Etzel street, St. Louis. Hot water heating systems are to be adopted throughout. The expenditure, it is said, will be something like $500,000.

PENNSYLVANIA RAILROAD COMPANY'S ventilating system in the Gallitzin tunnel, begun nearly a year ago, is at last completed and formally turned over to the Pittsburg division. The system consists of two large fans, one on each side of the track, and so constructed as to drive the smoke from the engines out of the tunnel ahead of the trains. It is estimated that the total cost of the system, including the work of reconstructing, will amount to $125,000.

PAXTON, ILL., boasts of "an ideal heating plant." The local electric light company laid a system of mains throughout the city and are thus enabled to furnish heat for stores or residences at very reasonable figures. The rate is 20 cents per year for each square foot of radiator service. Each section of a radiator is figured as five square feet, so that the total amount is readily computed. To heat an ordinary, average-sized residence is said to cost about $30.00 a year.

CENTRAL HEATING COMPANY, Milwaukee, Wis., which is endeavoring to secure a franchise from the Milwaukee officials to enable it to construct tunnels

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VACUUM STEAM HEATING SYSTEM
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for lines of steam heating pipes, has brought up an active discussion of the subject of central station heating which has for some time agitated the minds of steam and hot water fitting contractors in the Middle West. H. E. Fales, representing the Central Heating Company, says that one plant can furnish steam heat for a district a mile and a half in diameter.

BUILDING TRADE EMPLOYERS' ASSOCIATION, New York city, has begun an active canvass among its members in furtherance of its project to erect a commercial building, suitable space in which is to be reserved for the permanent headquarters of the association. In accordance with a resolution adopted at the annual meeting last month, the following were appointed to devise ways and means for the erection of such a building, which is estimated to cost $500,000: Charles T. Wills, chairman; William H. McCord, John I. Downey, Thos. Dimond, John J. Roberts, F. M. Weeks, R. F. Tucker and Lewis Harding.

Firm Holds Business Convention

A notable trade occurrence, on account of the many novel features connected with it, was the convention of the salesmen and branch managers of the Kellogg-Mackay-Cameron Company during the last week in April, at the headquarters of the company in Chicago.

There were about fifty representatives present from all parts of the country, and the meetings were presided over by Mr. C. V. Kellogg, president of the company, who spent the week in Chicago for that purpose.

The convention was the second annual meeting of the kind. It opened with a visit to the plant of the Kewanee Boiler Company at Kewanee, where the process of manufacture was thoroughly investigated by the visiting members. This was followed by the announcement of the following program for the remainder of the week, consisting of lectures, talks, discussions and conferences upon the various subjects connected with the work of the firm.

Thursday—Opening address: Co-operation and Profitable Salesmanship.

Address: The Manufacturing and Selling of Radiators. Care in Ordering and Suggestions for Improvement.

Friday—Address: Advertising. Following up Inquiries. Salesmen's Forms. Advertising Literature.

Address: Construction of Boilers. Boiler Fuels, Their Value and Efficiency. Competitor's Boilers. Selling Boilers and Warm Air Furnaces. Mail Order Business and Its Relations to the K.-M.-C. Co.

Address: Plumbing Goods. New Catalogues. Relation of the Association to the K.-M.-C. Co.

Address: Sprinklers and Fire Protection.

Saturday—Salesmanship, "The Firm on the Road." Prices and Values. Lists and Discounts.

Address: Credits and Terms.

Address: Purchasing Stock—Supply and Demand.

An enjoyable feature of the convention was the annual banquet given by the company at the Sherman House to the salesmen and entire office force on Friday evening. Mr. Kellogg presided as toastmaster and was most felicitous and apt in his remarks in introducing the large number of speakers. The responses to the impromptu toasts were well received while the silver-throated quartet rendered several well-chosen selections.

The company afterwards invited the members and the entire office force to the play at the Studebaker Theater, and the week closed with many expressions of highest satisfaction on the part of all the men who had taken an interest in the proceedings.

New Directory Now Ready

The New **PLUMBING AND HEATING "BUYERS'" DIRECTORY** is ready for delivery, containing **Manufacturers, Jobbers, Master Plumbers and Steam Fitters of United States and Canada,** with classified list of goods used in this trade, also the trade names for Closets, Bath Tubs and House Heaters, Etc. 450 pages, 6x8 inches, with each department full of valuable data to use daily. You cannot afford to be without it. We guarantee it as represented, and it is highly endorsed by the trade. Send for copy at once. Price, $5 00.

Plumbing and Heating Publishing Co.

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5032 METROPOLITAN BUILDING, NEW YORK

Trade Literature

HART & CROUSE, Utica, N. Y., have issued a new 48-page catalogue illustrating and describing "The Royal Family" of boilers. The catalogue also includes data regarding their New York series of radiators. A feature that has been introduced on all of the Royal sectional boilers is the new "feather" edge patented January 16 last, to eliminate the injurious action of rust. The catalogue measures 5x8 inches.

NIAGARA RADIATOR COMPANY, Buffalo, N. Y., have sent us a circular of some of their recent fans, together with a new 108-page catalogue giving complete tables, descriptions and illustrations of their line of boilers, blowers, and heating, ventilating and drying apparatus. The size of the circular is 6x9 inches. The catalogue measures 4½x7 inches.

GIBLIN & CO., Utica, N. Y., issue a new 24-page catalogue of furnaces and combination heaters that contains much interesting matter in addition to the descriptions and illustrations of the line manufactured by them. Directions for the setting up of heaters is given, also rules for determining sizes of pipe, cold air ducts, etc. The catalogue also contains a department of interesting "Useful Hints." Size, 5⅞x9⅛ inches.

New Firms

MANUEL-SMITH HEATING CO., Minneapolis, Minn., has been incorporated with a capital of $135,000. The incorporators are M. H. Manuel, Huron, S. D.; R. W. Manuel and Leo C. Smith, of Minneapolis.

LIGHT, HEAT & POWER CO., Connersville, Ind., is the name of a new corporation at that place, capitalized at $100,000. The directors are F. N. Burgess, L. O. Burgess and W. E. Lowe.

STARRATT & JONES CO., New York, is the title of a new firm capitalized at $10,000, to deal in steam fitting, plumbing and gas fitting supplies. The incorporators are Stonewall J. Starratt, George G. Jones, Brooklyn; Samuel B. Starratt, Hackensack, N. J., and three others.

J. D. KANE COMPANY, Dallas, Tex., has been capitalized at $25,000, to manufacture steam fitting, plumbing, gas and electrical goods. The incorporators are J. D. Kane, M. Estes and Lee Stephens.

COLUMBIA HEATING CO., Illinois, Mo., is incorporated with a capital of $35,000.

LAWRENCE PARK HEAT, LIGHT AND POWER CO., Yonkers, N. Y., has been capitalized at $50,000, to manufacture electric light, heat and power.

HORAN-MARSHALL COMPANY is the name of a new steam and hot water fitting concern at 17 New Chambers street, New York. A. D. Marshall, one of the members of the new firm, was for a number of years manager of the boiler department of the Boynton Furnace Company.

MIAMISBURG PLUMBING & HEATING CO., Miamisburg, Ohio, is the title of a new firm organized by C. Bauer and Samuel Sudypacker.

MEAGHER HEATING CO., Pittsburgh, Pa., has opened an office as steam and hot water heating and general piping contractors.

Business Changes

DOWNEY & KRUSE COMPANY, Milwaukee, Wis., successor to H. Mooers Company and The Charles B. Kruse Heating Company, is a consolidation of two of the oldest and most prominent firms of that city.

HOME HEAT & LIGHT COMPANY, Indianapolis, Ind., has gone on record before the local Board of Works as being unable to make a profit at the

The Albany Return Steam Traps

have been the **STANDARD** for over **THIRTY-TWO YEARS.** For returning water under pressure to the boiler, they will perform this duty fully as well, and in many cases better than the so-called steam loop.

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ALBANY STEAM TRAP CO., ALBANY, N.Y.

FREDERICK TOWNSEND, PRESIDENT

JAMES H. BLESSING, GEN. MGR.

present legal rates for their service, which is from 17 to 25 cents a square foot of radiating surface. The company has petitioned the board for a raise in the rates.

INTERNATIONAL HEATER COMPANY, Utica, N. Y., announces the removal of its New York office from the Flatiron building to room 5015, Metropolitan building, Madison avenue, Twenty-third street and Fourth avenue.

GREEN FUEL ECONOMIZER CO., Matteawan, N. Y., announces the appointment of H. J. Barron as one of its New York representatives in the sale of blowers, heaters and ventilating fans to the trade.

JOSEPH McCREERY COMPANY, Columbus, O., capital stock $10,000, has been incorporated to manufacture sheet iron and heating and ventilating apparatus. The incorporators are Vance McCreery, Williams E. Taylor, Gail McCreery, King McCreery and Charles A. Langdon.

RUHAAK & LACKMAN COMPANY, Pekin, Ill., has been consolidated with George A. Heilman & Co., in the heating and plumbing business.

MASON HEATER CO., Wheeling, W. Va., has been reorganized with a capital stock of $25,000, under the name of the Mason Heater & Foundry Co.

C. F. PAUL, JR., & CO., Stapleton, Staten Island, is the name of a new heating firm in that place. Mr. Paul was formerly in the steam and hot water fitting business in Peekskill, N. Y.

WESTERN TUBE COMPANY, Kewanee, Ill., announces the appointment of W. H. Douglas as sales manager of its New York office. Mr. Douglas was until recently the manager of Eaton, Cole & Burnham Company's New York office.

JOHN SIMMONS COMPANY, New York city, announces the opening of a new branch in Harlem, at 451, 453 and 455 West 125th street.

DAME & TOWNSEND COMPANY New York city, whose quarters on John street have been for years a landmark to the trade, has moved into its new offices at 27 Cliff street.

H. W. JOHNS-MANVILLE CO., New York city, announces the appointment of T. T. Lyman as general sales manager of the company. This firm has now eighteen branches, covering the United States and Europe.

AMERICAN RADIATOR COMPANY announces the retirement from active business of Henry Bond, chairman of the operating board. Mr. Bond, who retires on account of ill health, will be succeeded by William H. Hill, until now, secretary of the operating board. A. A. Landon has been appointed superintendent of plants, with headquarters at Chicago.

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THE EATON COLE & BURNHAM CO.

NEW YORK

WATER COLUMNS SAFETY VALVES

GEORGE A. SWALM & SON COMPANY, Middleton, N. Y., has been incorporated.

EATON, COLE & BURNHAM COMPANY, Bridgeport, Conn., has increased its capital stock from $50,000 to $800,000. This company has recently completed its big new plant at Bridgeport which, combined with the old plant, gives the firm the distinction of being one of the largest producers of steam fitting goods in the country. Frank J. Mulcahy, formerly soil pipe commissioner, has been appointed sales manager of the New York office.

UNITED STATES HEATER CO., Detroit, Mich., announces the increase of its common stock from $110,000 to $140,000, and of its preferred stock from $90,000 to $135,000.

NATIONAL HEAT REGULATING CO., Milwaukee, Wis., has been incorporated with a capital of $30,000. The incorporators are Arthur E. Gross, Charles E. Mueller and Fred. S. Robinson. The company will manufacture devices for regulating hot water and hot air heating, having control of a number of patents on these devices.

PRATT CHUCK COMPANY, Frankfort, N. Y., has let the contract for the construction of a new shop, 87x206 feet. The new building is designed to accommodate the firm's increasing business and its machinery will include a number of patterns designed by the firm.

HOWE MANUFACTURING CO., Louisville, Ky., with whom Blake & Andros, of Boston, have recently consolidated, is now represented in the New England territory by W. E. Blake and R. B. Andros.

THATCHER FURNACE COMPANY, New York, announces the opening of its "home" at 110, 112, 114 and 116 Beekman street, between Water and Pearl streets. The company now has more room and better facilities than ever before for conducting its business.

NORWALL MANUFACTURING CO. announces the removal of its New York office from 1123 Broadway to 42 East 23d street.

UNITED STATES HEATER COMPANY announces the appointment of Harry King to the staff at its New York office. Mr. King, who has been associated with other lines for several years, was formerly connected with the heating trade.

Contracts Awarded

B. G. CARPENTER & CO., Wilkes-Barre, Pa., has secured the contract for the heating and ventilating of the new Walnut Street school, in Hazleton City, Pa. Their bid was $3,675.

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Why not use Sunrays in your business?

We will make it pleasant and profitable for you to use them.

The J. L. Mott Iron Works

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SYMMS-POWERS CO., Aberdeen, Minn., has secured the heating contract for the workshop of the Northern Normal and Industrial School. The building is to cost $9,000.

W. E. WELCH, Clarinda, Iowa, has been awarded the contract for the erection of the heating plant at the Glenwood Institution. His bid was $23,428.75.

FALK & CO., McPherson, Kan., are installing a heating plant in the Citizens' State Bank.

ROBERTS-GOSS COMPANY and Hanke & Eha, St. Paul, Minn., were the lowest bidders for the heating, ventilating and plumbing of the Whittier and Hancock school additions. Roberts-Goss Company's bids were $3,850 for the Whittier school and $4,530 for the Hancock school. Hanke & Eha's bids were $3,933 and $4,074, respectively.

CENTRAL HEAT & POWER CO., Rockford, Ill., has closed a contract with the directors of the Rockford Hospital Association to supply the heat to this institution during the ensuing year.

CAROLINA PLUMBING & HEATING CO., Charlotte, N. C., has secured the contract for the heating, etc., of the new Agricultural building at the Agricultural and Mechanical College at that place. The amount of the successful bid was $6,725.

T. M. MAGUIRE, Minneapolis, Minn., was the lowest bidder on the work of installing a heating apparatus in the new public building at Pierre, S. D. His bid was $3,889.

GILLIS & GEOGHEGAN, New York city, have been awarded the second contract for the heating and ventilating work on the buildings of the College of the City of New York. Their bid was $220,900.

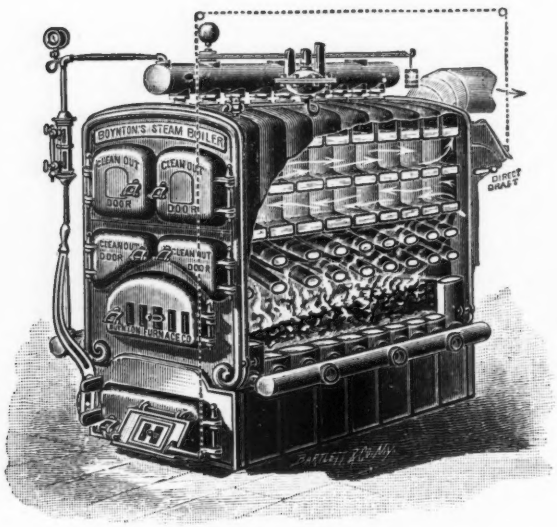
LANE & McNALLY, Hannibal, Mo., have been given the contract for steam heating the Mark Twain Hotel in that city.

M. L. PARKER COMPANY, Freeport, Ill., has secured the heating and plumbing contracts in the new F. R. Rice building.

CENTRAL HEAT & POWER CO. has the contract for heating the large hospital building of the Rockford City Hospital Association by steam from the plant on Chestnut street, and a request will be made of the council for the right to extend the company's main to the hospital buildings.

C. B. MIKA, Ortonville, Minn., has been awarded the contract for the heating, etc., in the new St. Hubert Hotel at Milbank. The amount of the contract is nearly $5,000.

The Boynton Steam Boilers and Hot Water Heaters



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ROBERT J. BIRCH & CO., White Plains, N. J., have been given the contract for the heating and plumbing of the new post office building at that place.

G. K. MORSE, Bellingham, Wash., are heating and plumbing the Grand Central Hotel.

GAYLORD & EITAPENC COMPANY, Scranton, Pa., is equipping the residence of E. B. Tustin, at Bloomsburg, Pa., with a $3,000 steam heating plant.

HARRY F. MURPHY & CO., Philadelphia, are heating a large school at Chestnut Hill.

JAMES H. MERRITT & CO., New York city, have been awarded the contract for steam heating the new $125,000 addition to the Y. M. C. A. building in Troy, N. Y.

GEORGE A. SUTER & CO., New York city, have the contract for installing a steam heating plant in the new De Witt Clinton High School, on Tenth avenue and Fifty-eighth street, New York city. This building is one of the largest ever built devoted to school purposes.

STANDARD TEMPERATURE REGULATION CO., New York city, has the contract for installing the Davis & Roesch system of temperature control in the new De Witt Clinton Public School on Tenth avenue.

ROSSMAN & BRACKEN, New York city, are heating the new public baths on East Seventy-sixth street, East Eleventh street and West Sixtieth street, New York. Work has also been started by them on the steam heating plant they are installing in the new administration building of the Willard Parker Hospital, Sixteenth street and East River.

RAUTMAN PLUMBING & HEATING CO., Seattle, Wash., have secured the heating and plumbing contract for the new Denny-Fuhrman school.

MORGAN COMPANY, Santa Clara, Cal., is installing a self-regulating heating and ventilating system in the new High School building in that city.

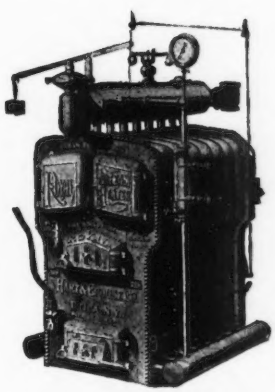
A. C. SMITH & CO., Newburgh, N. Y., have the contract for heating the new school house at Rosten, N. Y.

ARTHUR McGONAGLE COMPANY will install a steam heating and power plant in the new Mergenthaler factory in Brooklyn; also the new building for the Bush Company, at Broad and Pearl streets, the Dodge & Olcott building at 87 Fulton street, and the new Wendell building on William street, New York.

D. A. TOMPKINS COMPANY, Spartanburg, S. C., is installing a heating plant in the new post office building at Anniston, Ala., to cost $3,060.

H. A. MILLER, Wilmington, Del., is installing a hot water heating plant in a new building at the League Island Navy Yard.

ROYAL HEATERS



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DAVIS CONSTRUCTION COMPANY, Chicago, has the contract for the installation of a steam heating plant in the new factory of the American Electric Telephone Co., at Sixty-sixth and State streets.

Chances for Business

MANKATO, MINN.—The building committee of the school board has ordered Architect George Pass to draw plans for a heating plant to be installed in the West Mankato school.

PORTLAND, MICH.—At a special school meeting in District No. 3, it was decided to change the heating apparatus to steam at a cost of $2,500.

PITTSBURG, PA.—It is announced that the First National Bank will build a fine new building to cost $200,000. An elaborate heating system will be installed.

PITTSBURG, PA.—The Board of Education has arranged to build a new school house on Bedford avenue, to cost $90,000. F. J. Osterling, of Pittsburg, is the architect.

PITTSBURG, PA.—F. W. Hanich, 440 Fourth avenue, will build a large natatorium on Flavel street, East End. The plans have already been drawn by F. W. Braden, of Allegheny City.

PITTSBURG, PA.—The Hotel Anderson, one of the leading hotels, is to be remodeled, and among the improvements will be a complete new system of heating and ventilating.

AKRON, OHIO.—The Board of Education has authorized a bond issue of $300,000 to be used for overhauling the old school buildings and equipping them with modern plumbing and heating systems.

WANTED

WANTED—A first class, practical salesman to represent in the Metropolitan District a prominent manufacturer of heating boilers and radiators. Good and permanent position to right man. Address T. I. F., c|o HEATING AND VENTILATING MAGAZINE.

MANUFACTURER'S REPRESENTATIVE, favorably located and familiar with the business, wants boiler, radiator and other heating appliance agencies for Washington and Oregon. D. O., c|o HEATING AND VENTILATING MAGAZINE.

SITUATION WANTED.—A young man who has and can make money for a New York house is open for an engagement. Has had extensive experience in designing, estimating on and installing power, heating and ventilating plants. Can furnish A 1 New York reference. Address Estimating Engineer, care HEATING AND VENTILATING MAGAZINE.

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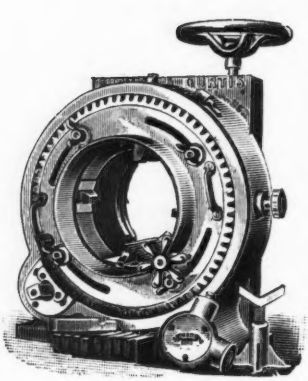

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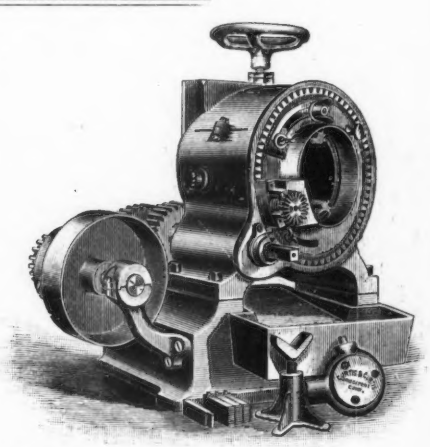

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